CT angiographic patterns of Thai diabetic patients with critical limb ischemia

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Objectives To define the distribution pattern of peripheral arterial disease (PAD) in diabetic patients with critical limb ischemia (CLI) by using CT angiography.

Methods Ninety seven femoral run-off computed tomographic angiographies (CTAs) of diabetic patients with CLI were reviewed retrospectively from March 2010 to January 2013. Vascular obstructive lesions were classified as aortoiliac, femoropopliteal and below knee segments, with details of stenotic severity and lengths. Distribution patterns were analyzed by the Pearson Chi square test.

Results There were 478 lesions in 194 limbs. Aortoiliac and femoropopliteal diseases were found more frequently than below knee disease (133 vs. 68) in stenotic lesions less than 10 cm (p = 0.0001) long. However, below knee segment was involved more frequently than above knee disease (121 vs. 30, p = 0.0001) for occlusions equal in length or longer than 10 cm.

Conclusions Above knee arterial stenoses are seen frequently as significant in diabetic patients with CLI, and the findings of this study demonstrate both interest in and opportunities for inflow revascularization with endovascular therapy. Chiang Mai Medical Journal 2013;52(3-4):51-55.

Keywords: critical limb ischemia, diabetes, CT angiography

Introduction

Critical limb ischemia (CLI) is a limb threatening condition with a high mortality rate, as approximately 20-25% of the patients die within one year post diagnosis [1]. Diabetes is a well known major risk factor for causing up to four fold increased chance of CLI development, and a high amputation rate of up to 5 to 10 times that for non-diabetic patients [1,2]. Revascularization, by either surgical bypass or endovascular therapy, is the main method for saving an affected limb, and the treatment plan is based on anatomical disease distribution, as mentioned in many major guidelines. Furthermore, infrapopliteal lesions are predominate in diabetic patients [2-4, 5].

Multidetector computed tomographic angiography (MDCTA) is a rapid and robust method for evaluating peripheral arterial disease. In the
authors’ experience, they frequently found stenotic lesions in the above knee arterial segment, which raised the question of disease distribution pattern in the Thai population. Therefore, this retrospective study aimed to define the distribution pattern of peripheral arterial disease (PAD) in diabetic patients with critical limb ischemia (CLI).

Material and methods

This study was approved by the local ethical committee. From March 2010 to January 2013, it retrospectively researched patients who underwent multidetector computed tomographic angiography (MDCTA) of the abdominal aorta, with a femoral run-off. There were 765 cases from the institutional radiology database of this study. One hundred and twenty four diabetic cases were found among this group by using criteria of currently used antihypoglycemia agents or fasting blood sugar of more than 126 mg/dL. Critical limb ischemia, classified as Rutherford class 4 to 6, was found in 97 patients. Demographic data including age, sex, smoking history, hypertension, dyslipidemia, and presence of cerebrovascular and coronary arterial diseases also were recorded.

MDCTAs were performed by a 64-slice dual source MDCT (Seimens) scanner from the thoracoabdominal aorta down to both feet using the dual energy technique with tube A (140kV, 56 mAs reference) and tube B (80 kV, 234 mAs reference) with autoexposure control (Caredose 4D, Siemens). Arterial phase images were obtained by using contrast bolus tracking at the common femoral artery. Then, 100 ml of non-ionic contrast media (350 mgI/mL) were injected intravenously at 4 mL/s, followed by 45 cc of contrast media at a rate of 2.2 cc/s, and subsequent flushing with 20 cc of saline. A 64 x 0.6 mm collimator and pitch of 0.8 and 0.5 s rotation time were used for scanning, with retrospective reconstruction into a 1.5 mm image slice thickness with 1.2 mm interval. Image reconstruction in multiplanar reforma-

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<th>Table 1. Demographic data of patients</th>
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Discussion

It has been known since 1964 that diabetic peripheral arterial disease mainly affect below knee arteries. This was described first by Strandness and confirmed later by many studies [6-10]. Graziani et al collected 417 diabetic patients with ischemic foot ulcers in a large series, and they classified lesions by using 10 cm as a cut point [8]. Graziani found that 74% of obstructive lesions were in below knee arteries [8]. This study found below knee lesions at 54.39% (260 from 478), which suggested that upper knee lesions in Thai patients may be higher than those in westerners. This finding may reveal a better chance of limb salvage in Thai patients.

This study also found that short segmental stenotic lesions of less than 10 cm long (66.16%, 133/201) had upper knee disease. Endovascular therapy is suitable for these kinds of lesions and it provides a greater opportunity for CLI patients to save their limbs; even though occlusions equal to or more than 10 cm long affect below knee arteries more than upper knee segments (121/151 vs. 30/151). The results of this study confirm the nature of infrapopliteal occlusive lesions in diabetic patients, as in prior studies [6-10].

Revascularization of below knee arteries is challenging and many new complex techniques have been developed for limb salvage that requires more specifically designed instruments. In contrast to upper knee disease, the revascularization technique, by either surgical or endovascular therapy, has been well established and uses less sophisticated instruments [3]. In this study, the upper knee stenotic lesions and occlusions were 45.61% (218/478), therefore, the opportunity of either endovascular treatment or surgical bypass should be allowed in these segments.

The authors are aware that MDCTA is limited in evaluating calcified arteries. Although catheter-based angiography is the gold standard imaging technique, the 64-slice MDCT apparently provides high image quality, which leads to appropriate treatment decisions [12]. However, this study was unable to assess below knee arteries confidently in one patient.

In conclusion, significant above knee arterial stenoses are seen frequently in diabetic patients with CLI, and the findings in this study demonstrate interest in and opportunities for inflow revascularization with endovascular therapy in Thai diabetic patients.

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Conflicts of Interest: none

References


รูปแบบของอุดตายคอมพิวเตอร์หลอดเลือดของผู้ป่วยบางวัยที่มีภาวะขาดเลือดเรื้อรังจากวิกฤติ

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วัตถุประสงค์ เพื่อศึกษาการประจำจำของโรคหลอดเลือดตีบตันในผู้ป่วยบางวัยที่มีภาวะขาดเลือดเรื้อรังจากวิกฤติโดยใช้คอมพิวเตอร์

วิธีการศึกษา เป็นการศึกษาอนามัยในช่วงระหว่างมีอายุ 25-54 ถึง 60 ปี ผู้ป่วย 2566 ราย โดยสุ่มคัดเก็บระยะเปลี่ยนแปลงต่ำสุดของผู้ป่วยที่มีภาวะขาดเลือดตีบตันมีวิกฤติจำนวน 97 ราย แบ่งรุ่นเป็นผู้ป่วยบางวัยที่มีภาวะขาดเลือดใน aortoiliac, femoropopliteal และระดับต่ำกว่าข้อเท้าไป และวัดระดับความรุนแรงและความยาวของโรคหลอดเลือด ทำการวิเคราะห์ข้อมูลทางสถิติด้วย Pearson Chi square test

ผลการศึกษา พบร้อยละ 478 ของผู้ป่วยอายุได้ 194 ราย พบว่าภาวะขาดเลือดตีบตันต่ำสุดจำนวน 10 รายมีแนวโน้มผิวขาว เป็นผู้ป่วย พบมีการระคายเคืองข้อเข่าเท้าผิวหนังกว่าร้อยละ (133 กับ 68) อย่างมีนัยสำคัญทางสถิติ (p =0.0001) แต่สำหรับโรคชนิดหลอดเลือดตีบตันพบเป็นระดับต่ำกว่าข้อเข่าเท้าผิวหนังมีนัยสำคัญทางสถิติ (121 กับ 30, p =0.0001)

สรุป ในผู้ป่วยบางวัยที่มีภาวะขาดเลือดเรื้อรังจากวิกฤติ มีหลอดเลือดตีบตันหลอดเลือดตีบในผู้ป่วยได้โดย ดังนั้นควรวิเคราะห์ข้อมูลของผู้ป่วยได้รับการวิเคราะห์และการรอยซึ่งการโรคหลอดเลือดตีบวิจัยการว่ากันผ่านหลอดเลือด เพื่อให้เหมาะสม

ความรู้ 2556:52(3-4):51-55.

ก้าวสำคัญ: ภาวะขาดเลือดเรื้อรังจากวิกฤติ บางวัย เอกสารอ่านคอมพิวเตอร์