

Penile gangrene in a patient on renal dialysis: CT findings

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Abstract

We presented a case of a 63-year-old man with type 2 diabetes mellitus and end-stage renal disease on hemodialysis. Precontrast CT images showed atrophy of kidneys bilaterally and calcification of the abdominal aorta, small branches of bilateral renal arteries and small arteries of the pelvis, including the internal pudendal artery and penile artery. Postcontrast CT scans revealed a nonenhancing glans penis with a clear margin relative to normal tissue. The CT findings were compatible with gangrenous penis and were confirmed by surgery and histology. Findings of CT images can help urologists to decide the cutting margin in planning surgery.

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1. Introduction

Penile gangrene can be caused by penile prostheses, diabetes, and end-stage renal disease on dialysis. Acute ischemia of the penis is rarely seen because of abundant collateral circulation for compensation [1]. The term of calciphylaxis means calcification and intimal fibrosis of medium-sized and small arteries with secondary gangrene of the affected tissues. Most of the cases with calciphylaxis occur in the distal extremities, buttocks and thighs. Penile involvement has rarely been reported [2–5]. To our knowledge, only one case with CT images of penile gangrene has been reported [3].

CT scan is the best image modality for evaluating arterial atherosclerotic changes. We report the CT findings from a 63-year-old patient with calciphylaxis and penile gangrene. The important role of CT images for surgical planning is discussed.

2. Case report

A 63-year-old man with a 16-year history of type 2 diabetes mellitus under regular insulin control also had end-stage

renal disease under hemodialysis. The patient had suffered from general weakness for several weeks before this admission and drowsiness for 1 day. Laboratory data showed leukocytosis and impaired renal function. Brain CT revealed multiple lesions in both hemispheres. Because of the appearance of brain abscess or metastasis, the patient was admitted for further evaluation. Abdominal and pelvic CT examinations revealed extensive calcification of the abdominal aorta and small branches of the renal arteries bilaterally (Fig. 1a), and symmetrical calcification of medium to small arteries in the pelvis, such as the internal obturator arteries, superior gluteal arteries, internal pudendal arteries, and penile arteries. The precontrast scans showed that the glans penis had a slightly lower density than that of the corpus cavernosa of the penis (Fig. 1b and c). After contrast medium administration, there was no enhancement at the glans penis and a demarcated margin relative to the enhanced corpus cavernosa of the penis (Fig. 1d). Gangrenous change of the penis was also noted.

With reference to the CT findings, partial penectomy was performed. On surgery, gangrenous change of the glans penis with a clear-cut margin between necrotic and normal tissue was noted. Histological diagnosis also confirmed the gangrenous change and calcification of the penile arteries (Fig. 1e).

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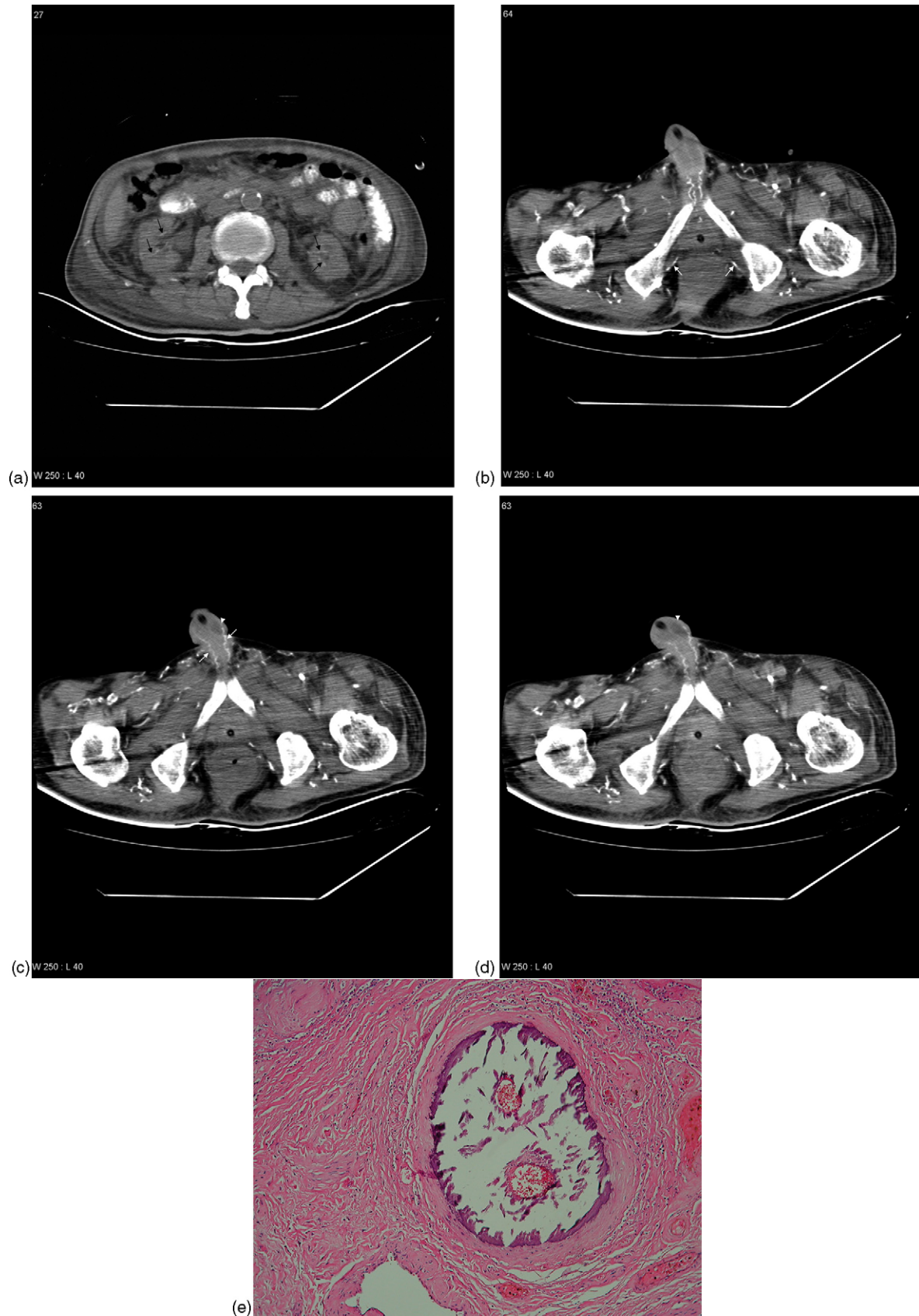


Fig. 1. (a–c) Precontrast abdominal and pelvis CT scan images. (a) Calcification of interlobar arteries (arrows) of both kidneys. (b) Calcification of medium- and small-sized arteries of the pelvis. Note bilateral internal pudendal arteries (arrows). (c) Calcification of bilateral penile arteries (arrows). Note low-density change of the glans penis (arrowhead). (d) Postcontrast CT scan image shows a clear margin between the gangrenous glans penis (arrowhead) and the viable enhancing corpus cavernosa of the penis. (e) Photomicrograph shows medial calcification and subintimal fibrosis of the specimen.

3. Discussion

Penile gangrene is a rare disease and only a few cases have been reported [2–5]. The most common causes of penile gangrene are diabetes mellitus and end-stage renal disease. The glans penis is supplied by ending arteries. A Foley catheter can aggravate the impaired blood flow. Bour and Steinhardt [6] reported two cases with penile gangrene associated with diabetes mellitus and end-stage renal disease. There was widespread medial calcification in the medium-sized arteries. Ashouri and Perez [7] reported another case with chronic renal failure presenting with penile necrosis. Radiographs revealed extensive vascular calcification.

The histology of penile gangrene is arterial obliteration resulting from extensive vascular calcification, reactive subintimal proliferation and fibrosis. The possible mechanism is impaired renal function causing elevation of phosphorus and calcium, resulting in an increase in parathyroid hormone, which promotes vascular calcification [4]. There is no absolute level of calcium phosphate product that will lead to vascular calcifications. CT scan is the most sensitive imaging modality for showing calcification. In our case, the calcification of the medium-sized and small-sized arteries was well depicted by precontrast CT scans (Fig. 1a–c). Most urologists prefer to perform partial penectomy because it can be technically easier for surgeons and psychologically more acceptable to patients than total penectomy. The important issue is how to decide on the surgical margin. Postcontrast CT scans can accurately show the border between necrotic and viable tissue of the penis (Fig. 1d). However, most of these patients have renal insufficiency, and contrast medium can cause renal toxicity in these patients. In this situation, Doppler ultrasound is helpful to evaluate the circulatory supplies of the penis, although evaluation of abdominal and pelvic vessels is limited. The combination of noncontrast CT scans and Doppler ultrasound is an alternative modality of choice. For those patients with renal failure under hemodialysis, contrast-enhanced CT scans can be done. Noncontrast CT scan

can be helpful to show medium- and small-sized arteries, while contrast-enhanced CT images can provide useful information about the sectional margin for penile gangrene.

In summary, CT scans can be the best imaging modality to evaluate extensive calcification of medium- and small-sized arteries in patients with penile gangrene and can provide urologists with important information for surgical planning of penectomy.

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