J Cardiol 2002 Jan; 39(1): 59–62

Cardiovascular Imaging In-a-Month

●A 68-Year-Old Man With Renal Artery Stenosis

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CASE

A 68-year-old man was referred for investigation of a hepatic mass, which led to the diagnosis of hemangioma. However, digital subtraction angiography (DSA) of the abdominal aorta performed during the investigation suggested left renal artery stenosis at 10 mm from the margin of the abdominal aortic lumen (**Fig. 1**).

His blood pressure was 146/84 mmHg, and pulse rhythm was regular. Vascular bruit at the upper back was unclear, and plasma renin activity was within the normal limits.

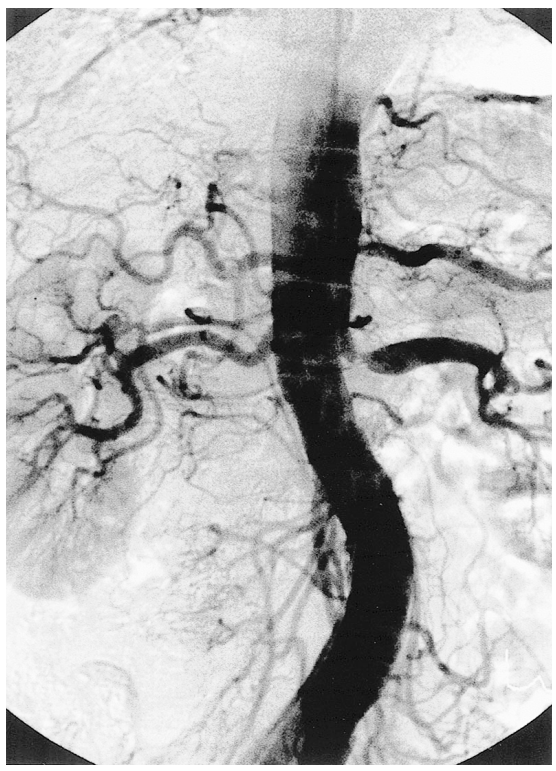

Fig. 1

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Manuscript received July 30, 2001; revised August 20, 2001; accepted August 24, 2001

Points for Diagnosis

DSA of the abdominal aorta (**Fig. 1**) showed severe left renal artery stenosis at about 10 mm from the margin of the aortic lumen. The location of the stenosis suggested that the stenosis was not at the renal arterial ostium, but in the renal arterial trunk.

Spiral computed tomography (CT) with contrast medium showed outpouching of the aorta (infundibulum) and the distal renal artery stenosis (**Fig. 2**). In addition, calcification was shown in the infundibulum[1].

CT angiography of maximum intensity projection (**Fig. 3**) clearly showed high grade calcification in the aortic infundibulum and the distal renal artery stenosis. Moreover, severe calcification was shown in the lower abdominal aorta.

Virtual CT angioscopy visualized both the undulating inner surface of the abdominal aortic lumen (**Fig. 4**), and a large nodular calcification at the well-developed infundibulum followed by narrowing of the renal arterial lumen (**Fig. 5**).

Cross-sectional CT imaging and three-dimensional representation suggested that the stenosis was located at the transition of the infundibulum and the correct origin of renal artery trunk. We considered that the renal artery stenosis was not situated in the renal artery trunk, but at the origin of the renal artery.

Our overall assessment is based on the previous report of " pseudotruncal " renal artery stenosis[2], described as angiographic truncal stenosis located at more than 4 mm from the outer margin of the aortic lumen, because CT scan revealed that the aortic infundibulum was partly filled with calcification or thrombus and located proximal to the stenosis. CT was superior to DSA for visualizing the infundibulum.

When the infundibulum is partially filled with calcification or thrombus or both, the short tract within the infundibulum mimics a normal proximal segment of the renal artery. On the other hand, severe calcification in the aortic wall indicates advanced atherosclerosis, and the aortic infundibulum is usually associated with atherosclerotic renal artery stenosis[2].

Renal artery stenosis such as that in the present patient should not be released immediately, because the blood pressure and plasma renin activity are not elevated. However, the renal artery stenosis should be resolved to improve hypertension in the presence of elevated blood pressure and plasma renin activity.

Stent implantation is suitable for the treatment of " pseudotruncal " ostial stenosis[3], but whether stent implantation is useful in the present situation remains unknown.

Diagnosis: " Pseudotruncal " ostial renal artery stenosis with large nodular calcification within the well-developed aortic infundibulum.

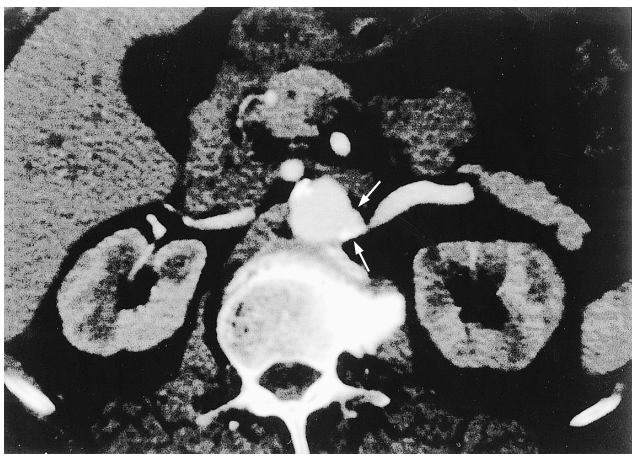

Fig. 2

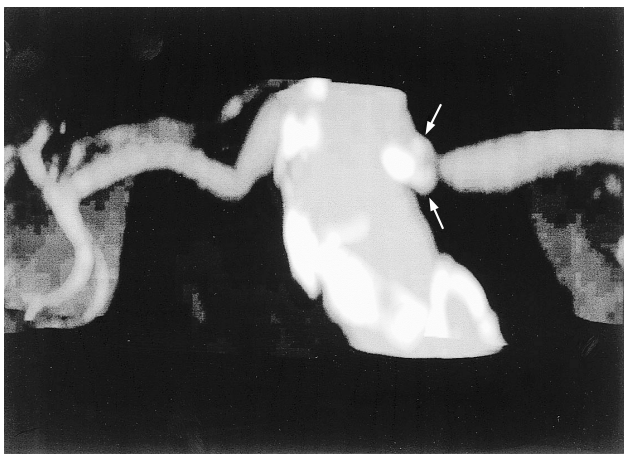

Fig. 3

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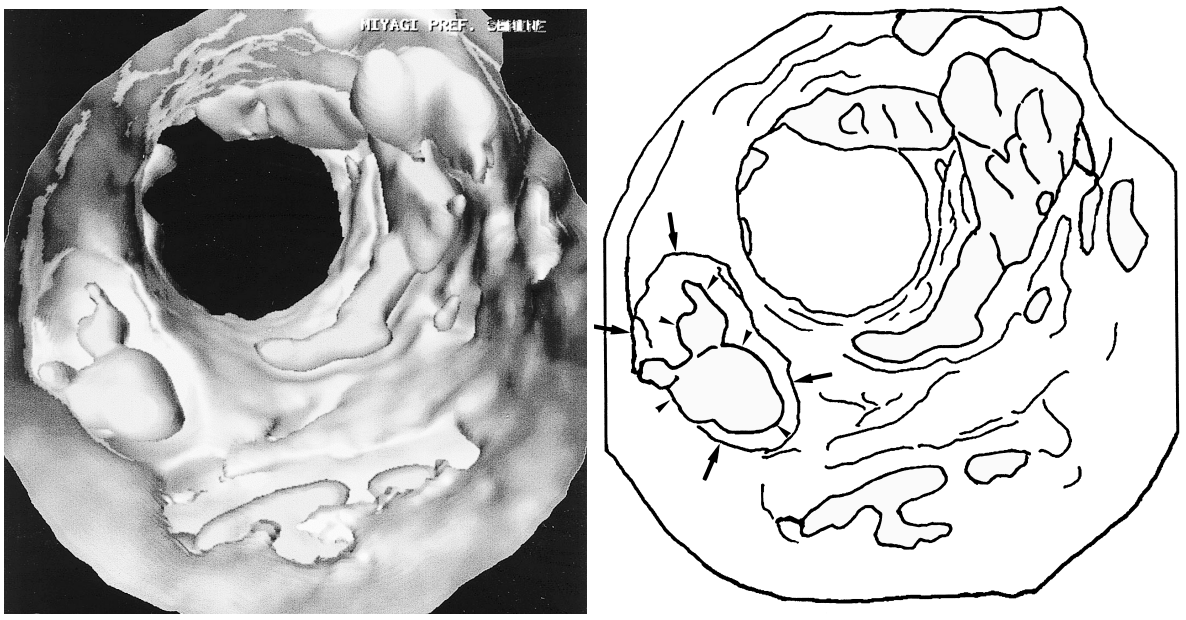

Fig. 4

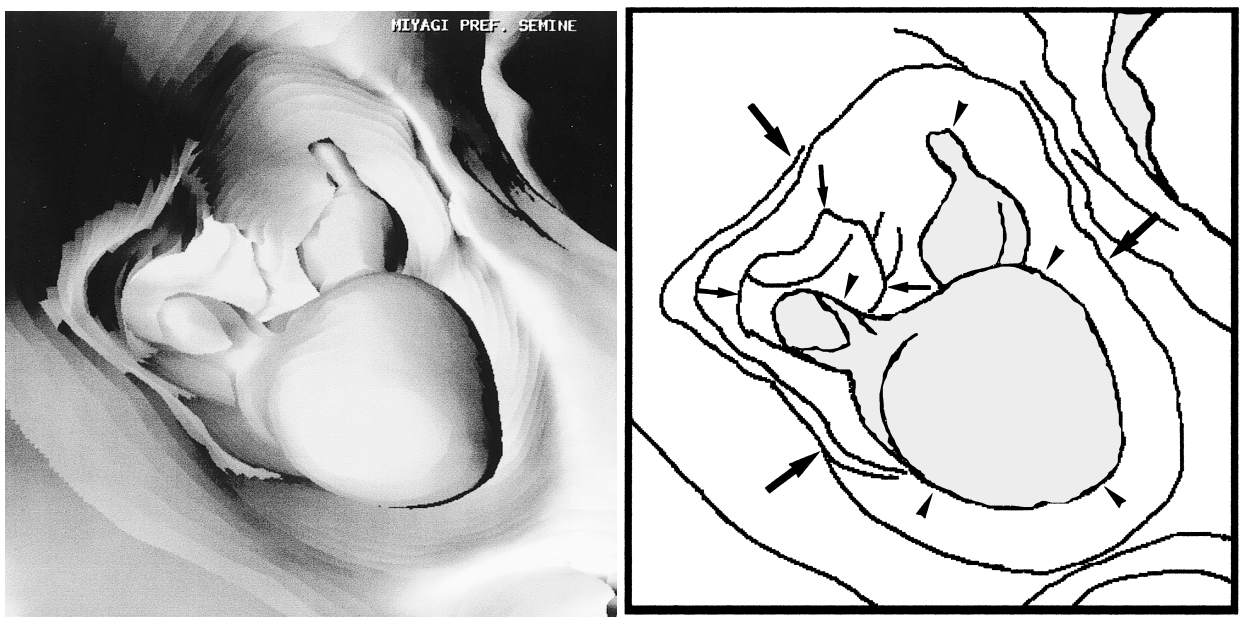

Fig. 5

Fig. 1 Digital subtraction angiogram of the abdominal aorta demonstrating narrowing of the left renal artery
Severe left renal artery stenosis is located at 10 mm from the margin of the aortic lumen, and is followed by a post-stenotic dilatation.

Fig. 2 Cross-sectional computed tomographic imaging with contrast medium showing the infundibulum (*arrows*) which is partially filled with calcification and followed by severe stenosis
Calcification is also seen at the opposite site of the infundibulum.

Fig. 3 Maximum intensity projection imaging demonstrating that most of the infundibulum (*arrows*) is filled with calcification and followed by renal artery stenosis
Severe calcification is demonstrated in the lower abdominal aorta.

Fig. 4 Virtual computed tomographic angioscopy (*left*) and scheme (*right*) of the abdominal aorta from head to foot projection demonstrating the undulating inner surface and mural calcification of the aorta
Left: Threshold levels of the computed tomography value of the inner surface and mural calcification are 100 HU and 330 HU, respectively.
Right: White segments show the inner surface of the aortic lumen, and dark segments show the severe mural calcification. The infundibulum of the aortic wall (*arrows*) and nodular calcification (*arrowheads*) are visible.

Fig. 5 Virtual computed tomographic angioscopy (*left*) and scheme (*right*) approaching the infundibulum
Left: The nodular calcification has higher computed tomography values than the enhanced aortic lumen, and therefore the nodular calcification in this image is similar to the real nodule.
Right: Dark segments at the infundibulum (*large arrows*) show the nodular calcification (*arrowheads*), and the narrowing of the lumen (*small arrows*) at the origin of left renal artery located behind the nodular calcification.