

The Stenting to Internal Carotid Artery Stenosis (ICS) in Petrous Portion

The Evaluation of Plaque Figures in Magnetic Resonance Image

K. HAYASHI, H. SEYAMA, N. YAMADA*, K. MURAO, K. IIHARA, J.C. TAKAHASHI, N. NAKAJIMA, T. SAYAMA, M. MORIMOTO, H. MORI, M. YAMAMOTO, T. HISHIKAWA, Y. NONAKA, J. AYABE, T. KIKUCHI, M. HYUGA, M. OOKAWA, T. KUDO, S. MIYAMOTO

Department of Neurosurgery, National Cardiovascular Center, Osaka, Japan

*Department of Radiology and Nuclear Medicine, National Cardiovascular Center, Osaka, Japan

Key words: Petrous carotid stenosis, plaque characterization, MPRAGE

Summary

In the safety stenting, it is important to get to know the characteristics of a plaque. In petrous carotid artery stenosis, it is difficult to know the characteristics of the plaque. We paid our attention to the MPRAGE (Magnetization Prepared Rapid Acquisition with Gradient Echo) method on high resolving power MRI.

By the MPRAGE method, low intensity was observed in these lesions of all cases. This result suggested that the plaque in petrous portion was a fibrous plaque. This method is useful to get to know the characteristics of a plaque in petrous portion before endovascular treatment.

Introduction

The stenting to ICS or the origin of vertebral-artery stenosis have recently been performed much number as magnifying of indication, improvement of an instrument and so on^{1,2}.

The stenting to ICS in bifurcation became quite possible in detailed to plaque characterization with various modalities, such as an echo check and helical CT, progresses, and examination³⁻⁷.

On the other hand, in petrous portion, it was not well known about its plaque characterization as the anatomical characteristics or the dif-

ficulties of diagnostic by an ultrasonography or computed tomography.

In some references, the high resolving power MRI was pictured, therefore it was possible to evaluate the plaque characteristics such as soft plaque containing cholesterol, necrosis, haemorrhage, etc. and hard plaque containing fibrous tissue and calcification^{8,9}. In this study, we evaluated plaque characterization using the MPRAGE method on MRI in ICS on petrous portion.

Methods

Four patients among treated cases with DSA from November 2003 to August, 2004 are evaluated ICS in petrous portion with MRI-MPRAGE methods. The detail of the high resolving power MRI has been reported as the procedure, and progress of the image pick-up procedure. We paid our attention to the MPRAGE method in the various image pick-up procedures. This procedure is the method to emphasize the tissue contrast. In ICS of bifurcation, this procedure was also used as control and evaluated effectiveness in plaque characterization.

In these four cases, the signal intensity in the MRI-MPRAGE method was estimated as plaque figures and perioperative complication of these patients was investigated.



Figure 1 Case1. A) MPRAGE image demonstrating low intensity plaque of petrous carotid artery stenosis (arrow). B) Source image of 3D-TOF demonstrating petrous carotid artery stenosis (arrow). C) preoperative angiogram demonstrating severe petrous carotid artery stenosis (arrow). D) postoperative angiogram demonstrating good result on PTA (arrow).

Results

In the MPRAGE method, low intensity was observed in these lesions of all cases (table 1). The first case was performed PTA (figure 1), the second case was performed the stenting in petrous portion (figure 2), and the others were considered as follow-up. A clinical complica-

tion was not observed in those treated cases and distal embolism image was not accepted in DWI study on post-operative MRI.

Discussion

Carotid stenting (CAS) is beginning to spread quickly as a cure over carotid artery

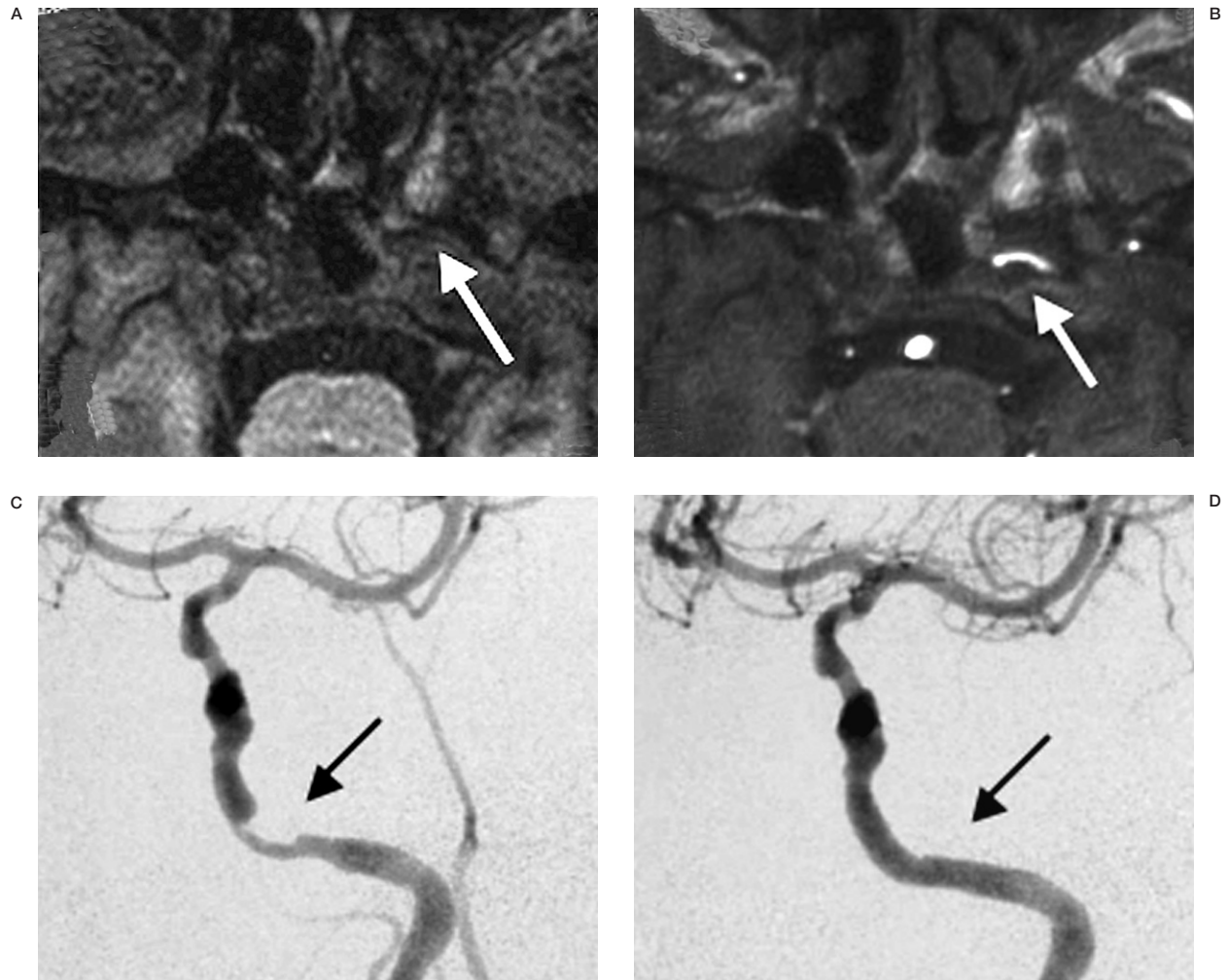


Figure 2 Case2. A) MPRAGE image demonstrating low intensity plaque of petrous carotid artery stenosis (arrow). B) Source image of 3D-TOF demonstrating petrous carotid artery stenosis (arrow). C) preoperative angiogram demonstrating severe petrous carotid artery stenosis (arrow). D) postoperative angiogram demonstrating good result on stenting (arrow).

stenosis. One of the serious complications of this CAS is distal embolism. Although various protection device as the preventive measures is developed, it is thought that the prevention effect of distal embolism is not perfect and CAS to the carotid stenosis containing the component of soft plaque is high-risk at present. Therefore, when performing safe stent placement, preoperative plaque characteristic evaluation is very important.

The stenting to ICS in petrous portion is beginning to be performed by the development with the thin diameter of device. Until now, it has been thought that the characterization of the plaque in this portion is hard plaque con-

sisted of fibrous tissue. However, the characterization of the plaque of this part is actually unknown. As a plaque characterization appraisal

Table 1 Summary of all cases.

Case	age/sex	rate of stenosis	MPRAGE	treatment
1	59/male	80%	low	PTA
2	74/male	80%	low	Stenting
3	60/male	87%	low	Medical Tx.
4	56/male	66%	low	Medical Tx.

method, the cervical echo check has been widely used from the former. This procedure cannot be used in the internal carotid artery surrounded by the petrous bone. Although the procedure of an intravascular echo check is possible also by this part, there are problems, such as invasiveness and the possibility of the embolic complication in an advanced stenosis lesion.

Recently, the usefulness of the high resolving power MRI has been reported as the procedure of the plaque evaluation in ICS with development of an instrument and progress of the image pick-up procedure. Therefore we investigate on these patients with these lesions by the MPRAGE method with the various image pick-up procedures. Since a pathology specimen was not obtained, the decision was not completed, but as for this, plaque of the petrous carotid artery stenosis resulted in supporting that it is fibrous plaque as was said from the former.

Conclusions

In the petrous carotid artery stenosis, only endovascular treatment is possible for recovering an antegrade blood flow. In a case uncontrollable by medication, endovascular treatment is an important therapeutic procedure and it is thought that the role will become large from now on. It is required to grasp the characterization of a plaque beforehand in order to treat more safely CAS. Characteristic diagnosis of the plaque using this MPRAGE method did not have an attack either, it is the procedure of doing simple, it was thought that qualitative diagnosis whether a plaque is hard at least or it is soft was attained, and it was thought that it was a useful procedure.

The MRI-MPRAGE method can expect the useful method for the investigation the plaque characterization of the petrous carotid artery stenosis.

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K. Hayashi, M.D.
Department of Neurosurgery
National Cardiovascular Center
Osaka, Japan