MRI AND ASYMPTOMATIC COARCTATION OF THE FRONTAL LATERAL VENTRICLE HORN

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SUMMARY

Six patients (ages ranging from 19 days to 58 years; three females and three males) with frontal horn coarctations are included into this study. Four of these six patients were found during our consecutive evaluation of 1022 cranial MR imaging examinations, obtained on a 0.5 Tesla unit. The condition was compared with ependymitis granularis. The sizes (largest diameter) of the frontal horn coarctations varied between 7 to 18 mm. There were five patients with unilateral coarctation, and one was bilateral. In a patient the frontal horn coarctation resulted from the fusion of the left leaf of the septum pellucidum to the ventricular ependyma. Another patient was associated with unilateral megalencephaly. We found a frequency of approximately 0.38% for frontal horn coarctation, and this is apparently lower than that (6%) described in previous CT studies. The frequency of «ependymitis granularis» was approximately 65.5%.

Key-words: Brain, MR studies. Ependymal fusion. Ventricular coarctation.

INTRODUCTION

Coarctation of the frontal horns refers to a condition of unknown etiology in which the ependyma of the frontal horns are fused or appears to be fused. This data is mainly based on previous cadaver and CT studies [1, 4]. In this communication we describe our MR imaging findings in frontal horn coarctation. It is compared with ependymitis granularis.

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comprising 118 cases. Pediatric patients were included in the study, excluded from this division of the study. The remaining hydrocephalus, diffuse atrophy, infectious and metabolic with trauma, periventricular leukomalacia, infarction, in order to avoid adult individuals with periventricular (282 patients, ages ranging from 1 day to 18 years) in purpose we used the pediatric patient population only patient (fig. 1), and unilateral in five. Four of these are shown in figures 2-5. The lesion involved the right frontal horn in four patients. In one case, the condition was apparently due to the fusion of the left leaf of the septum pelucidum to the ventricular ependyma, resulting in an asymmetrical cavum septi pellucidi (fig. 5). A patient was associated with unilateral megalencephaly (fig. 4). The size of the coarctations ranged from 7 mm to 18 mm, as measured in their largest diameters. Their signal pattern closely followed that of cerebrospinal fluid (CSF) (fig. 2).

The frequency of «ependymitis granularis» was approximately 65.5% in this series covering the pediatric population (fig. 6, 7). The MR appearance of frontal horn coarctation was different from this relatively common condition called «ependymitis granularis» that the latter was usually bilateral, smaller in size (1-4 mm diameter), and revealed high signal both on the 1st and 2nd echo of the T2-weighted sequences. Thus, the signal pattern did not follow that of CSF (it had relatively high signal on proton density-weighted images) (fig. 6, 7). The signal pattern of frontal horn coarctation, however, closely followed that of CSF (non of the coarctation cases showed high signal on proton density-weighted images) (fig. 2).

The frequency of frontal horn coarctation was calculated to be approximately 0.38% (four out of 1022 patients) in this series.

RESULTS

Six patients had apparent coarctation of the frontal horns. The condition was bilateral in one patient (fig. 1), and unilateral in five. Four of these are shown in figures 2-5. The lesion involved the right frontal horn in four patients. In one case, the condition was apparently due to the fusion of the left leaf of the septum pelucidum to the ventricular ependyma, resulting in an asymmetrical cavum septi pellucidi (fig. 5). A patient was associated with unilateral megalencephaly (fig. 4). The size of the coarctations ranged from 7 mm to 18 mm, as measured in their largest diameters. Their signal pattern closely followed that of cerebrospinal fluid (CSF) (fig. 2).

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DISCUSSION

Adhesions between the two facing ventricular walls, have generally been referred to as ventricular coarctation. With respect to the MRI appearance, the signal pattern of frontal horn coarctation closely follows that of CSF. Previous histopathological reports cited that ventricular coarctation most commonly occurs at the region of the frontal horns in the opposing ependymal walls between the caudate nucleus and corpus callosum (1-4). In the normal population, a frequency of about 6% was given for frontal horn coarctation [3]. Others, commented that the condition is more common at the region of occipital horns [3, 5]. According to some authors, this results in a so-called «accessory occipital ventricle, and a frequency of approximately 17 to 21% was given for this condition [4, 5]. Although these conditions were originally recognized and described in autopsy studies [1, 2], comments on their frequencies mainly originated from pneumoencephalography and CT studies [3, 6]. On the other hand, histopathological studies cited a frequency of approximately 74.4% for ependymitis granularis [2], while these were more frequently found in MR imaging studies [7].

In the present MR imaging study we found a frequency of approximately 0.38% for frontal horn coarctation, and this is apparently lower than that (6%) described in previous CT studies [3]. We believe that this discrepancy (0.38% vs. 6%) may be due to the limited capability of the CT scan in different orthogonal planes other than the axial plane, and commonly used relatively thick slices (e.g. 10-mm sections) in routine CT studies. These probably cause overestimation of such an appearance, frontal horn coarctation, hence higher frequencies. We noted that the sizes (largest diameter) of such coarctations differed between 7 to 18 mm. There were five patients with unilateral frontal horn coarctation (fig. 2, 5), and only one was bilateral (fig. 1). We particularly noted that in a patient the frontal horn coarctation resulted from the fusion of the left leaf of the septum pelucidum to the ventricular ependyma (fig. 5). Another patient was associated with unilateral megalencephaly (fig. 4).

Ependymitis granularis is currently considered to be a normal condition. Histopathological studies showed that ependymitis granularis is produced by a patchy loss of ependyma in the frontal horns with astrocytic gliosis. Also, in this region there is a loose network of axon with low myelin content, and there is an increased water content [7]. These cause small areas just anterior and lateral to each frontal horn on MR imaging, and are referred to as ependymitis granularis. We found a frequency of approximately 65.5% for ependymitis granularis, in a pediatric population (ages from 1 day to 18 years). This is in conformity with previous histopathological observations (74.4%), however Sze et al. [7], in a patient population ranging in age.
**FIG. 1 a-c.** – T1-weighted, sagittal (a), and axial (b, c) MR images show bilateral frontal horn coarctations (arrows).

**FIG. 2 a, b.** – T1-weighted, axial (a), and proton density-weighted axial (b) MR images show a right-sided frontal horn coarctation (arrows).
Fig. 3 a, b. – T1-weighted, sagittal (a), and axial (b) MR images obtained after administration of contrast medium show coarctation of the right frontal horn (arrows).

Fig. 3 a, b. – Coupes pondérées en T1. Sagittale (a) et axiale (b) après injection du produit de contraste. Coarctation frontale à droite (flèche).

Fig. 4. – CT scan shows coarctation of the right frontal horn (arrow) in this patient with unilateral megalencephaly. Note that the right hemisphere and hemicranium are larger than the left. There is a characteristic enlargement of the right lateral ventricle for unilateral megalencephaly.

Fig. 4. – Tomographie cérébrale. Coarctation de la corne frontale droite (flèche) et mégalencéphalie. L’hémisphère et l’hémicrâne droits sont plus grands qu’à gauche. Dilatation caractéristique du ventricule latéral droit de la mégalencéphalie unilatérale.

Fig. 5. – T1-weighted, coronal MR image obtained after administration of contrast medium shows fusion of the left leaf of the septum pellucidum to the ventricular ependyma (arrow), resulting in an asymmetrical cavum septi pellucidi.

Fig. 5. – Coupe coronale. Pondérée en T1 après injection du produit de contraste. Union du feuillette gauche du septum à l’épendyme ventriculaire (flèche), conséquence d’une asymétrie du cavum.
from 9 months to 82 years, reported a much higher frequency that almost all of the patients showed this condition on MR imaging.

The main differences between ependymitis granularis and frontal horn coarctation are ependymitis granularis is usually bilateral, and smaller in size (1-4 mm in diameter). It shows high signal not only on the 2nd echo of the T2-weighted sequences, but also on the 1st echo (i.e. proton density-weighted images) (fig. 6, 7). The signal pattern of frontal horn coarctation, however, closely follows that of CSF. It is usually larger (7-18 mm in diameter). Also, it is usually unilateral (five out of six cases in this study were unilateral).

With respect to the so-called accessory occipital ventricle, an ependymal fusion has been reported on some histopathological studies, which separates the tip of the occipital horn from the rest of the ventricle, hence an isolated ventricle, a mechanism similar to frontal horn coarctation [5, 6]. Some authors gave a frequency of approximately 17 to 21% for this condition [5, 6]. In a recent MR imaging study we found that in 24 % of cases there is a deep calcarine sulcus and prominent calcar avis, which creates the appearance of the so-called occipital ventricle in the absence of a true fusion [8].

REFERENCES