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Clinical Evaluation of Congenital Muscular Torticollis by using MR Imaging

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INTRODUCTION

Congenital muscular torticollis is caused by swelling of unknown origin within the sternocleidomastoid muscle. A mass is palpable at birth or in early infancy. The reported incidence of congenital muscular torticollis is 0.4% in newborn babies. It is believed that it usually diminishes within a year. Conservative treatment is recommended in early infancy. If the treatment fails and torticollis remains, surgery is needed, because permanent torticollis becomes worse during growth and causes asymmetry of the face and skull.

It is difficult to judge clinically whether the patient needs surgery or conservative treatment and whether the patient needs to continue conservative treatment.

MR imaging is a preferred method to investigate muscleskeletal lesions and provides information of fibrosis. There is no systematic evaluation of congenital muscular torticollis by MR imaging. The purpose of this paper is to demonstrate MR imaging patterns of swelling of sternocleidomastoid muscle and the stages of congenital muscular torticollis for its judgement and in selection of treatments.

MATERIALS AND METHODS

Fifteen patients of congenital muscular torticollis who were previously non-treated underwent MR imaging. They were 8 men and 7 women, ranging in age from 1 month to 24 years 5 months. Six patients were under 1 year old and the rest were protracted by type definition. MR imaging was accomplished with a 1.5 T superconducting system (Sigma, General Electric Medical System, Milwaukee, WI, U.S.A.) using head coil or anterior-neck coil. For most patients the scanning protocol consisted of axial and coronal T1 weighted image 360/15 (TR,TE/excitations) a matrix of 256 × 192, axial T2 weighted and proton density weighted image 2000/80, 40/2 a matrix of 256 × 128. A slice thickness of 5mm with 1mm gap and a 16cm field-of-view were used. Contrast enhancement
was performed in 6 patients with Gd-DTPA at a dose of 0.1 mmol/kg (Magnevist, Nihon Schering). To depict the lesion of the sternocleidomastoid muscle, we order the T1 weighted, T2 weighted and proton density weighted images in 3 grades: excellent, good and poor (Table 1). According to signal intensity of the proton density weighted image, the lesions are classified into 4 types (Table 2): Type 1, localized high signal intensity; Type 2, reticular pattern of high and low signal intensity; Type 3, reticular pattern of low signal intensity; Type 4, localized low signal intensity.

**RESULTS**

To depict the lesion of the sternocleidomastoid muscle, proton density weighted images are superior to the T1 weighted and T2 weighted images (Table 1).

The patients under 1 year old were treated with cap brace therapy which could roll the head free for conservative treatment of congenital muscular torticollis. Two among 6 patients of under 1 year old underwent plural MR imaging during treatment. One patient of 1 month 10 day old female underwent 4 times of MR imaging and the other patient of 4 month old male underwent 5 times of MR imaging during treatment. The signal intensity of the lesions on proton density weighted images gradually changed from high signal intensity to low signal intensity as both of the patients grew older (Fig. 1). According to signal intensity of the proton density weighted image, the lesions are able to be classified into 4 types as mentioned above (Table 2). Figures of each type are illustrated from Fig. 2 to Fig. 5. Based on these observations, we classified all cases of proton density weighted images of initial examination according to types and ages (Table 3). Of six patients who were under 1 year old: 4 belonged to type 1, the remaining 3 belonged to type 2. Of nine patients who were over 1 year old: 6 belonged to type 3, 4 belonged to type 4.

We examined 5 cases of torticollis with contrast enhancement. Three belonged to type 3 and 3 belonged to type 4. All patients were over 1 year old. No evidence of abnormal enhancement was demonstrated on T1W image, but rather clearly visualized a low signal intensity lesion of the affected side (Fig. 5).

**DISCUSSION**

MR imaging is a good modality to examine lesions of the musculoskeletal system. Mass in the sternocleidomastoid muscle of congenital muscular torticollis is well visualized on proton density weighted images in this study. Whyte and his colleagues first reported a case of a 10-year-old girl with left sided torticollis. MR of the neck showed abnormal shape and decreased signal intensity of the affected sternocleidomastoid muscle on a T1 weighted image. No T2 weighted or proton density weighted image appeared. Whyte’s findings were consistent with muscular fibrosis subsequently demonstrated in histopathological examinations following surgical treatment. The patients of our cases were classified by imaging patterns of the lesions in the sternocleidomastoid muscle at initial examination. All six patients under 1 year old belonged to type 1 or 2, had high signal intensity in the lesion. On the other hand, all 9 patients over 1 year old belonged to type 3 or 4. That is, high signal intensity lesions were frequently seen in younger patients and low signal intensity lesions were seen in elder patients. In general, edema and edematous regions demonstrated high signal intensity on T2 weighted and proton density images but iso- or mild low signal intensity on T1 weighted images. On the contrary, the lesions with little or no signal on T2 weighted images may be the result of low proton density as seen in some fibrous lesions, scar tissue and so on. We regard type 1 as MR presentation pattern of edema. Types 2 to 4 show the process of fibroic change.

Ultrasonography is a useful method for evaluating neck mass and also utilized for examining children of congenital muscular torticollis. Chan and his colleagues reported systemic
ultrasound study of congenital muscular torticollis. The ultrasound appearance of the masses have a patchy or homogeneous echo-texture. No ultrasonography of the progress of the lesion was demonstrated. They stated that the patchy echo-cuxure is more commonly seen in the one month group and may correspond to the early edematous stage with early degeneration of muscle fibers. The homogeneous echo-texture of the masses are seen at a later stage, but patchy echo-texture still exist: at 8-24 months of age. That shows degeneration of muscle fibers are still in progress even in some older patients. It is easy to
judge the process of fibrotic change on MR imaging. Our study also demonstrate type 3 of incomplete fibrosis in older patients. It is suggested that while most congenital muscular torticollis are completely fibrosis within a year, there are some lesions accomplish a fibrosis over one year.

Contrast enhancement was done to 6 patients of congenital muscular torticollis who belonged to type 3 or 4. There were no abnormal enhancements of the lesions. Contrast enhancement is useless in patients with fibrotic change of the lesion.

It is suggested that when the lesion demonstrates low signal intensity of fibrotic change at initial examination with torticollis posture, the patient needs surgery. When it is altered from types 1 or 2 to types 3 or 4 of low signal intensity during conservative treatment, surgery is needed in patients still demonstrating torticollis posture.

**CONCLUSION**

Proton density weighted imaging is proper for the depiction of mass of congenital muscular torticollis. The patterns of MR findings can be classified into 4 types which express the stages of torticollis. The lesion of signal intensity on MR imaging gradually changes from type 1 to type 4. Types 1 and 2 of high signal intensity present edematous changes and types 3 and 4 of low signal intensity lesions present fibrotic changes. There was no effect of contrast enhancement for types 3 and 4 because of fibrotic changes. MR imaging is valuable for the judgment and in selection of treatment of congenital muscular torticollis.

**REFERENCES**