

Results of radiological follow-up of untreated anterior disc displacement without reduction in adolescents

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Abstract

Our aim was to assess the progression of disease without treatment in adolescents with non-reducible anterior disc displacement (ADD) using serial magnetic resonance images (MRI). We retrospectively reviewed all patients under the age of 20 years who had unilateral non-reducible ADD and had had two MRI during a period of 6 months with no intervention. A total of 124 patients (101 female and 23 male) with a mean (range) age of 16 (10–20) years had 2 MRI at least 6 months apart (mean (range) 14 (6–47) months). At the initial visit there was a significant difference between the involved and the non-involved sides in the incidence of condylar degeneration and effusion ($p=0.0001$). The effusion significantly decreased despite the lack of intervention, the amount of disc deformation significantly increased ($p=0.003$), and the degree of condylar degeneration increased from 61%–69%, but this did not differ significantly. We conclude that during the period of observation there was a significant reduction in the incidence of effusion and significant increase in disc deformation. Whilst there was an increase in the changes on the condylar surface, this was not significant.

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Introduction

Anterior disc displacement (ADD) is either reducible or non-reducible and may lead to arthralgia, limitation of mouth opening, and dysfunction of the joint.¹ There are various ways of managing this but there is currently no consensus, and an understanding of how the disease progresses without intervention would help to develop a standard protocol.

Many people have examined the clinical outcomes of ADD during its natural history, and found that joint pain can be alleviated and jaw function improved in many patients.^{2,3} Radiological studies have suggested that the disc may remain displaced, and that deformity of the disc and degeneration of

bone may accelerate during follow-up,^{4–6} even though clinical symptoms may improve. However, such studies have been in adults. Hall⁷ speculated that ADD in adults may result in condylar degeneration, but that more serious consequences could be expected in adolescents, such as limitation of mandibular growth. The radiological changes in adolescents with untreated non-reducible ADD therefore warrant further exploration.

The purpose of this study was to assess the degree of condylar degeneration, effusion from the joint, and deformation of the disc in adolescents with unilateral non-reducible ADD, and to find out how these progress without intervention. The healthy TMJ on the other side served as the control.

Patients and Methods

We retrospectively reviewed all patients who attended the TMJ division of Shanghai Ninth People's Hospital. Patients

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with symptoms suggestive of ADD had an MRI to confirm their diagnosis. Treatment of patients with non-reducible ADD included none, physiotherapy, drugs, splint, or operation. If the patients chose no treatment then regular review was suggested, with a follow-up MRI to detect whether there were any changes in the TMJ during its natural course, no matter whether they had symptoms or not. The interval between the two MRI was at least 6 months.

This retrospective study was approved by our institutional review board, number 2014108.

Inclusion and exclusion criteria

Patients were included if they were between 10 and 20 years old, had two MRI records separated by more than 6 months, if the MRI was taken between January 2010 and June 2013, if they had unilateral non-reducible ADD confirmed by MRI, had no treatment either before the first visit or during the follow up, and if they had no history of infection, injury to the jaws, or congenital, developmental, or systematic disorders that may have affected craniofacial growth.

They were excluded if the MRI was of poor quality as a result of, for example, a movement artefact.

Collection of data

All MRI were taken using a 1.5-T scanner (Signa; General Electric, Milwaukee, WI) with bilateral 3-inch TMJ surface coil receivers. Discs were normally biconcave on the MRI, with the signal intensity lower than that of the bony cortex, but higher than that of muscle.

The position of the disc in the parasagittal plane was defined as the posterior band of the disc located at the superior, or 12-o'clock, position, relative to the condyle. All the assessments were made twice by the first author, with an interval of one week. The inconsistent cases were discussed and decided by all the authors. Intra-examiner variability was assessed with Cohen's kappa for the two assessments. Condylar degeneration was diagnosed when erosion, sclerosis, flattening, and osteophytes were detected. Loss of biconcave disc shape or unusual signal properties, or both, indicated a "deformed" disc. Effusion was noted when increased intensity was seen on T2-weighted imaging.

Statistical analysis

The data were analysed with the aid of SAS version 13 for Windows (SAS, Cary, NC, USA). The chi square test was used to assess the significance of differences in condylar degeneration, joint effusion, and disc deformation between the healthy side and the side with non-reducible ADD, and between the initial visit and the second visit. Probabilities of less than 0.05 were accepted as significant.

Table 1
Details of the 124 patients studied.

Variable	No (%)
Sex:	
Male	23 (19)
Female	101 (81)
Age group (years):	
10-15	47 (38)
16-20	77 (62)
Interval between initial visit and return (months):	
12 or fewer	79 (64)
12-24	35 (28)
>24	10 (8)

Results

A total of 137 patients were collected, but 13 were excluded, so the final total was 124, whose ages ranged from 10-20 years at the initial visit (mean 16 years). The mean interval between the initial visit and the return visit was 14 months (range 6-47). There were 101 girls (82%), and 23 boys (19%) (Table 1).

At the initial visit, the incidence of condylar degeneration and effusion in the affected side were much higher than those in the healthy side ($p < 0.0001$). Discs were deformed in fewer than half of the affected joints, and all on the healthy side had a good biconcave shape (Table 2). At the second visit, the incidence of effusion had decreased significantly ($p = 0.01$, while that on the healthy side stayed low. The incidence of deformation of the disc increased significantly ($p = 0.003$), while all the discs on the healthy side maintained a good biconcave shape. The incidence of condylar degeneration increased, but not significantly so ($p = 0.14$). No new onset of condylar degeneration was detected on the healthy side (Table 2). Although the incidence of condylar degeneration did not change significantly, it did deteriorate in some cases. The normal shape of the condyle, and even the condylar height, was lost (Table 2). A typical case is shown in Figure 1.

Discussion

A full understanding of the natural course of ADD is useful when choosing appropriate management. Many studies have reported that the clinical symptoms of ADD can spontaneously resolve over time. However, radiological changes have seldom been followed up, particularly MRI. In this retrospective study we aimed to assess the progression of condylar degeneration, joint effusion, and disc deformation using MRI in adolescents with unilateral non-reducible ADD who had not been treated. The results showed that condylar degeneration, effusion, and disc deformation were common in adolescents with non-reducible ADD, which was much higher than in the normal joint.

We suggest that condylar degeneration is related to non-reducible ADD, which is consistent with the results of many studies in adults.⁸⁻¹⁰ Adolescents are growing fast and the

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