Clinical aspects of orthodontic treatment for children with juvenile chronic arthritis

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Growth abnormalities as a consequence of temporomandibular joint arthritis in children with juvenile chronic arthritis are difficult and complicated problems to treat. The diagnosis of the inflammatory condition in the joint is difficult but important to the success of the interceptive treatment. The diagnostic problems, treatment objectives, and treatment suggestions are discussed in this article. □ *Growth abnormalities; juvenile arthritis; temporomandibular joint; treatment*

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The involvement of the temporomandibular joint (TMJ) in juvenile chronic arthritis (JCA) has been of major concern in the treatment of this disease. For several years there has been an increasing demand from patients, pediatricians, orthodontists, and oral surgeons for handling of these problems. The effect of the disease on this joint has distinct consequences, and in contrast to effects on other joints, it will seldom go into total remission (1). TMJ arthritis, as seen in JCA and other types of arthropathies, is among the pathologic conditions that cause abnormal growth, primarily of the mandible (2). The pathologic craniofacial development distinctive for JCA with TMJ affections has been described in detail (3–9), but little has been published on treatment of this joint or the craniofacial discrepancies (10–13). The skeletal and dentoalveolar changes of main interest are reduction of the posterior face height related to reduction of the ramus height (9, 14), secondary decreased height of the posterior region of the maxilla (15), increased mandibular inclination (16), decreased mandibular prognathism (4), increase of the jaw angle (5), bone apposition in the angular area (17), anteriorly increased mandibular dentoalveolar height (14, 18), open bite, and large overjet (19).

Diagnosis of TMJ arthritis

The diagnosis of arthritis activity in the TMJ is more difficult than in other joints involved in JCA. The criteria for arthritis do not seem to be as clinically evident, and symptoms from the TMJ are often missing or weak (19–21). Therefore, often TMJ arthritis is first seen by a pediatrician or the child's parents at a stage when a significant growth disturbance is evident and treatment becomes more complicated. It has not been possible to link certain clinical signs or symptoms to the earliest arthritis changes (22), and the patients are most often referred when radiographic changes of the condylar head are evident and changes of the mandibular position and soft tissue matrix have already occurred. These changes are probably the result of a long-standing arthritis.

Radiographic changes of the condylar bone are seen in approximately 60% of JCA patients (23–25), but it has also been shown that JCA patients without condylar resorptions have smaller mandibles than healthy children (6). An explanation of the impaired growth of the mandible without radiographic changes could be an influence on the growth of periods of active arthritis and is that difficult to diagnose. A recent study (26) on magnetic resonance imaging with gadolinium enhancement of the TMJ in consecutively chosen JCA patients has shown a prevalence of arthritis up to 87%. Not all of the patients in the study showed resorptions, and the arthritis could disappear without radiologic hard tissue changes but with a change in jaw relation, probably due to temporary growth reduction. This emphasizes the need for careful follow-up by a specialist in craniofacial development and TMJ function in order to start the right treatment at the right time.

Treatment objectives in JCA patients

The general purposes of treating a patient with JCA are to relieve the child from pain and to avoid any permanent damage of the joints and growth disturbances. The goal is to allow the child to live a normal life as a child as well as an adult, hoping for remission of the disease in adolescence, which will happen for 70% of the patients (27).

Regarding the TMJ involvement, these main goals should be kept in mind also when planning the orthodontic/orthopedic treatment of the craniomandibular disturbances. However, there are differences in priorities since the course of TMJ arthritis is frequently without symptoms and the demand for controlling severe pain is less pronounced. Managing the destruction of the joints and the growth changes is of paramount importance.

These factors lead to craniomandibular disorders causing pain and impediments of the stomatognathic system.

The TMJ in a growing individual has a great potential for dynamic structural changes (11, 28), and if favorable functional conditions are created, growth seems to have an ability to normalize (11). The inflammation has to be controlled by proper medical care in general, and normal mandibular growth has to be supported from the beginning of the TMJ arthritis. By following the patients closely, the TMJ arthritis can be detected early and proper treatment can be started before the hard and soft tissue changes aggravate the situation. It is still a question whether the general medical care has an effect on the TMJ.

Reducing the inflammatory activity by steroid injections

The possibility of controlling the inflammatory activity by steroid injections in the joint has often been discussed. Successful treatment of adults has been reported (29, 30). The indications for treatment are to relieve pain and improve function. So far no controlled studies have been done in growing individuals, and well-defined indications are lacking. Further research in this area is necessary before routine steroid injections can become a part of the treatment. It will be of great importance if the inflammation can be detected and treated early, avoiding destruction of the joint, but the effect on the growing mandible has to be clarified. The TMJ is different than other joints with regard to embryology, bone formation, maturation, growth, type of cartilage, and loading, and experience of intra-articular injections is difficult to transfer to the TMJ.

Functional improvement by exercise

Atrophy of the muscles as a late consequence has been reported (5, 7). Also, clinical experience shows that the masseter muscle in particular becomes short, thick, and less extended when the TMJ is affected. In cases with unilateral TMJ involvement, the differences of the masseter muscles are clinically obvious. Bite force is lower in JCA children (31), and despite weak subjective symptoms there could be clinical signs of temporomandibular dysfunction (20, 21, 31). The functional impairment might lead to a vicious circle in relation to growth of the craniomandibular complex. In this context exercise and training of the masticatory system are an important part of the treatment (10).

Initial splint treatment

For improvement of the function and for unloading the joint during the period with arthritis activity, a bite splint can be used. The symptoms that might be present will often disappear in 4–8 weeks (32). In most cases the symptoms will reappear if the splint treatment is terminated. The splint can beneficially be changed to a distraction splint. The principle is to gradually unload the joint, guide the mandible into the normal anterior rotational growth pattern, and change the position of the lower jaw (11).

Treatment with functional appliances

The treatment can if necessary be altered to an activator or Herbst appliance. Conventional activator treatment has been shown to have an effect on moderate skeletal abnormalities in JCA patients (12). However, it is important not to anticipate a normal reaction from the joint as if it was that of a healthy orthodontic patient with no abnormalities in the joints. If changes in mandibular position fail to appear, the risk of undesirable dentoalveolar compensations will increase. The compensations will compromise the preparation for later surgical treatment.

Surgical treatment

If the combined splint and activator (Herbst) treatment does not give an acceptable result, an orthognathic surgical treatment can be offered. It is of utmost importance that the total treatment is planned properly. Every step in the treatment has to aim for the same goal. For the surgical part this means the splint/activator treatment should support the movements of the jaws and prepare the soft tissue, which is a requirement for the quality and stability of the final result.

Discussion

Growth disturbances as a consequence of TMJ pathology are challenging problems for the orthodontic profession. In the treatment approach it is important to distinguish between malocclusion and discrepancies in jaw relation within normal growth and an abnormal growth path caused by a pathologic condition. There is a pronounced need for criteria to facilitate early diagnosis of TMJ arthritis in order to introduce comprehensive treatment.

The treatment is of long duration and includes interceptive, functional, and surgical principles as well as fixed appliances to reach an acceptable result. Even if a proper result is not achieved by interceptive and functional treatment, these will always give an advantage when surgical treatment is introduced.

In the treatment course joint and muscular exercises seem to be beneficial along with the orthopedic and orthodontic treatment. The success of treatment is dependent on early diagnosis and interceptive treatment in which the objectives are mainly to support the function

and normal growth of bone and soft tissue. In some cases sufficient response is seen and treatment can be terminated after a long interceptive treatment. It is therefore highly recommendable to follow JCA children with respect to the masticatory function, monitoring the functional ability of the TMJ in order to start treatment as soon as the inflammation starts in the joint. These procedures may lead to the exclusion of later need for surgical intervention.

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