Concise report

Safety and efficacy of US-guided CS injection into temporomandibular joints in children with active JIA

Shabina Habibi¹, Jane Ellis², Helen Strike² and Athimalaipet V. Ramanan²

Abstract

Objective. To assess the safety and efficacy of US-guided CS injection done by a paediatric rheumatologist into the TM joints (TMJs) in children with JIA.

Methods. Children with JIA presenting to the rheumatology clinic were assessed for TMJ arthritis. Triamcinolone hexacetonide was injected in children with active arthritis assessed by MRI using US guidance under general anaesthesia by the same paediatric rheumatologist trained in the procedure. Efficacy and safety were assessed post-injection by patient-guided symptoms and physical examination.

Results. Thirty-eight children (34 girls) with JIA who had TMJ injection done between January 2009 and January 2011 were included in the analysis. Mean age was 12.25 (± 3.55) (range 5–18) years. The mean disease duration was 4.54 (±2.73) (range 1.5–11.1) years. Symptoms pre-injection were pain in 17/38 (44.7%), jaw deviation in 14/38 (36.8%), restricted jaw movement in 13/38 (34.2%) and chewing dysfunction in 7/38 (18.4%). Five (12.5%) children had micrognathia. A total of 63 joints were injected. The injection was efficacious in 58/63 (92.06%) joints. All 17 (100%) children had resolution of pain, and chewing dysfunction improved in 5/7 (71.4%). Jaw deviation improved in 13/14 (92.8%). In the 5/63 (7.9%) injections that were not efficacious, two children with both TMJs injected (four joints) had persisting stiffness with chewing dysfunction and one had persistent jaw deviation. One child developed a scar at the site of injection.

Conclusion. US-guided CS injection into the TMJ done by a paediatric rheumatologist trained in the procedure is safe with a high rate of success.

Key words: JIA, temporomandibular joint arthritis, intra-articular corticosteroid, ultrasound, paediatric rheumatologist.

Introduction

JIA is the most common inflammatory arthritis of childhood [1]. Prevalence of TM joint (TMJ) arthritis in JIA varies widely, with reported rates ranging from 17% to 87% [2]. Even in children with newly diagnosed JIA, about three-quarters have active TMJ arthritis detected by MRI [3]. This joint is highly susceptible to destruction due to inflammation because of its unique anatomy, as the growth plate of the mandibular head is situated just beneath the fibrocartilage [4]. Active arthritis of this joint may be asymptomatic in a vast majority of children, or manifest as pain, especially with jaw movement, chewing difficulty or restricted mouth opening [5]. Untreated inflammation with joint destruction can lead to asymmetrical mandibular growth with jaw deviation, dental malocclusion and micrognathia [6, 7]. As many children may not have physical findings, imaging using MRI is often necessary for diagnosis of active arthritis [8, 9]. IA injection of CSs is widely advocated for treatment of inflammation in JIA [10]. IA injection for TMJ arthritis has also been found to be effective [11, 12]. There are scarce reports on the effectiveness of using US to guide CS injections into the TMJs in JIA [13]. We report on the safety and efficacy of
US-guided CS injection done by a paediatric rheumatologist into the TMJs in children with JIA.

**Patients and methods**

This was a retrospective audit, whereby records of children with JIA diagnosed according to the ILAR classification were retrieved. The study was approved by the hospital and certified as not requiring ethics approval. Those with a clinical suspicion of TMJ arthritis underwent MRI using gadolinium contrast, which confirmed the presence of inflammatory arthritis. In these children, triamcinolone hexacetonide [10 mg for children 10–20 kg body weight (BW); 15 mg for 20–40 kg BW and 20 mg for >40 kg BW] was injected under sterile conditions using US guidance under general anaesthesia. Each joint injected was counted separately (e.g. if both the joints were injected, they were counted as two joints). All the injections were done by the same paediatric rheumatologist trained in the procedure. Needle placement and visualization of the injectant for localization and distribution was assessed using US (Fig. 1). Needle placement was considered acceptable if the tip of the needle was within the joint space. Efficacy and safety were assessed in a follow-up visit at the rheumatology clinic 6–8 weeks post-injection. Children having a significant decrease in pain, chewing dysfunction, stiffness and tenderness and improvement of jaw deviation were classified as having a good response. All the above were assessed in the post-injection follow-up visit. Pain on chewing and jaw pain were specifically asked about but not recorded on a scale. Mouth opening (assessed as the number of finger placements possible) and jaw deviation (defined as asymmetric movement of the mandible during mouth opening) post-injection were assessed clinically, but no objective measurements were made. Potential complications were also assessed.

**Results**

Thirty-nine children with TMJ arthritis confirmed by MRI imaging were injected with triamcinolone hexacetonide using US to guide needle placement. A total of 63 joints were injected. Twenty-four children had both TMJs injected. There were 35 girls and 4 boys. Mean age was 12.25 (± 3.55) (range 5–18) years and the mean disease duration was 4.54 (± 2.73) (range 1.5–11.1) years. The children were classified into the different subtypes of JIA as given in Table 1. One child with MCTD who had TMJ arthritis was also injected. Twenty-six children were receiving MTX and nine were on anti-TNF-α therapy (etanercept = four, adalimumab = four, infliximab = one). One child was on anakinra.

The symptoms pre-injection were pain in 17/39 (43.5%), jaw deviation in 14/39 (35.8%), restricted jaw movement in 13/39 (33.3%) and chewing dysfunction in 7/39 (17.9%). Five (12.8%) children had micrognathia. Efficacy of the CS injection as assessed by resolution of symptoms and physical examination was observed in 58/63 (92.06%) joints. The number of children with improvement of their symptoms is given in Table 2. In the 5/63 (7.9%) injections that were not efficacious, two children with both TMJs injected (four joints) had persisting stiffness with chewing dysfunction and one with left TMJ injected had persistent jaw deviation. The 91.6% of children with both TMJs injected had a favourable response as compared with 93.3% of children with a single TMJ injected. The overall response was similar on both sides in those children who

### Table 1 Distribution of the children in the different subtypes of JIA

<table>
<thead>
<tr>
<th>Subtype of arthritis</th>
<th>Study group (n = 38)</th>
</tr>
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<tbody>
<tr>
<td>Systemic onset, n (%)</td>
<td>3 (7.8)</td>
</tr>
<tr>
<td>Oligoarticular, n (%)</td>
<td></td>
</tr>
<tr>
<td>Persistent</td>
<td>11 (28.9)</td>
</tr>
<tr>
<td>Extended</td>
<td>9 (23.6)</td>
</tr>
<tr>
<td>Polyarticular, n (%)</td>
<td></td>
</tr>
<tr>
<td>RF negative</td>
<td>12 (31.5)</td>
</tr>
<tr>
<td>RF positive</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Juvenile PsA, n (%)</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Enthesitis-related arthritis, n (%)</td>
<td>1 (2.6)</td>
</tr>
<tr>
<td>Others, n (%)</td>
<td>0 (0)</td>
</tr>
</tbody>
</table>

*aOne child with MCTD had TMJ injected.

### Table 2 Improvement in symptoms

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Improvement, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain/tenderness/stiffness [17]</td>
<td>17 (100)</td>
</tr>
<tr>
<td>Jaw deviation [14]</td>
<td>13 (92.8)</td>
</tr>
<tr>
<td>Chewing dysfunction [7]</td>
<td>5 (71.4)</td>
</tr>
</tbody>
</table>
received bilateral injections. One child developed a scar at the site of injection.

**Discussion**

We found that >90% of children with TMJ arthritis had a significant improvement of their symptoms with CS injection given under US guidance. Pain resolved in all children. However, stiffness with chewing dysfunction and jaw deviation were more resistant to therapy. US is being increasingly utilized for guiding needle placement for local CS injection, especially in adults with various types of inflammatory arthritis [14, 15]. It has been found to be significantly more effective than blind injection by palpation in different joints in adults with OA or other inflammatory arthritis [15]. Use of this imaging modality in children with JIA is yet to be widely explored. As it is relatively inexpensive, widely available and portable, it has the potential for being increasingly utilized for guiding CS injections.

IA CSs (IASs) have been found to be effective for peripheral arthritis in children [10, 16]. However, there have been some earlier concerns for their use for TMJ arthritis due to reports of damage to the condyle, reduced mandibular growth, ankylosis and lipoatrophy [17–20]. However, subsequently various reports in children with JIA have found them to be effective, improving clinical and radiological features. A study utilizing CT guidance for injection reported significant resolution of pain and mouth opening as assessed by maximal incisal opening (MIO) following IAS injection, with minimal side effects [12]. Another study where IASs were injected into the TMJs without imaging guidance found a significant improvement in mouth opening as assessed by MIO [11].

There is just one study that utilized US to guide needle placement for TMJ IAS injections [13]. The injections were performed by interventional radiologists. IA needle placement was confirmed by CT in 70% of the cases. This was done depending on the radiologist’s preference or availability of the scanner. Minor adjustment of the needle position was required in 16%, and the needle position was unacceptable in 9%. In 30% of the cases, CT confirmation of needle position was not done. Despite this, follow-up showed the injections to be efficacious in 91% of the children, with just one major complication of skin atrophy. The authors concluded that TMJ injections using US is safe, effective and accurate. The high success rate along with avoidance of exposure to radiation by CT is a major advantage. It is also important to recognize that many centres may not have CT to confirm needle placement.

The fact that we assessed the efficacy of the injection using subjective symptoms and physical findings, and did not include more objective measures such as MIO or MRI post-injection are indeed limitations of our study.

To our knowledge, ours is the first study in which a paediatric rheumatologist used US guidance for IAS injection into the TMJs in children with JIA. In our experience, the high success rate with minimal side effects emphasizes the potential utility of this procedure. Training of paediatric rheumatologists in the technique could be valuable, and it may be potentially useful to draw attention to this in the training curriculum.

### Rheumatology key messages

- The majority of children with active TMJ arthritis improve after CS injection under US guidance.
- US-guided injections of the TMJ in children with JIA are safe and well tolerated.
- Training of paediatric rheumatologists in US-guided joint injections could be of potential value.

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**References**

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