Patients profiles and outcomes of care in temporomandibular disorders

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Publication date
2018

Document Version
Other version

License
Other

Citation for published version (APA):
Evaluation of arthrocentesis with hyaluronic acid injection plus oral glucosamine hydrochloride for temporomandibular joint osteoarthritis in oral health related quality of life

This chapter has been published as:

Abstract

Objectives: To evaluate the changes in oral health related quality of life (OHRQoL) in patients with temporomandibular joint osteoarthritis (TMJ OA) who underwent five weekly hyaluronic acid injections together with oral glucosamine hydrochloride for three months.

Materials and methods: This prospective observational study included 211 consecutive patients who completed the Chinese version of the 14-item Oral Health Impact Profile (OHIP-C14) before treatment (T0), and at first month (T1), third month (T2), and sixth month (T3) after the first injection.

Results: Significant changes in the sum scores on the OHIP-C14 were observed during follow-up (P < 0.001). The scores were significantly reduced at T1, T2, and T3 compared with T0 (P < 0.001), and were significantly reduced from T0 to T1 (P < 0.001) and T1 to T2 (P < 0.001), but not from T2 to T3 (P=0.369). Compared with the norms of the OHIP-C14 in Chinese population, the OHIP-C14 scores were significantly higher at T0 (P < 0.001), not significantly different at T1 (P = 0.482), and significantly lower at T2 (P = 0.013) and T3 (P = 0.003). The changes in the scores differed significantly among age groups (P = 0.012) but not between genders (P = 0.293).

Conclusions: TMJ OA has a negative effect on patients’ OHRQoL. OHRQoL scores were improved to normal levels in both short and long terms after the treatment. OHRQoL improvement was the greatest in the youngest group, but did not differ between genders.
Introduction

Oral health related quality of life (OHRQoL) is a multidimensional concept which assesses the impact of oral conditions on individuals’ normal functions [1]. Various questionnaires have been developed to assess OHRQoL in recent decades [2]. The Oral Health Impact Profile (OHIP), which has been shown to have satisfactory psychometric properties [3], is widely accepted in dentistry for the assessment of patient-centred oral health [4]. The OHIP uses a frequency-based approach and is presented as a full 49-item version (OHIP-49) and a 14-item abbreviated version (OHIP-14) [5].

Temporomandibular disorders (TMDs) are painful musculoskeletal involving the temporomandibular joints (TMJs), masticatory muscles, and other relevant structures, and the main clinical symptoms are orofacial pain, limited mouth opening, and TMJ click [5,6]. Up to one third of the population suffer TMDs [7], and OHRQoL is negatively affected in these individuals [8]. Osteoarthritis (OA) of the TMJs is a very common and severe form of TMDs and is associated with pain in the TMJs [9]. The burden of OA will intensify as the world’s population ages [10].

Temporomandibular joint osteoarthritis (TMJ OA) can be treated clinically with arthrocentesis with hyaluronic acid (HA) injections, which is widely used in the treatment of TMD and has proved to be highly efficient in improving jaw function and reducing pain levels in TMJ OA patients [11]. Glucosamine has recently been suggested to relieve the symptoms of patients suffering OA by supplying the components for cartilage repair, thus alleviating pain and disability [10]. Several clinical trials have reported the excellent efficacy and safety of glucosamine hydrochloride (GH) in treating OA of the knees and hips [12,13].

The aim of this study was to evaluate the changes in OHRQoL after patients with TMJ OA received arthrocentesis with HA injections combined with oral GH in the short term and long term, and to assess in which age group and gender group the treatment was most effective in improving OHRQoL.

Material and methods

Study design

This was a prospective observational study including adult patients who underwent treatment for TMJ OA at the Department of Oral and Maxillofacial Surgery at West
China Hospital of Stomatology, Chengdu, China. The study complied with the principles of the Declaration of Helsinki. A consecutive sample of 286 patients at the department was screened for their suitability to receive arthrocentesis with HA injections (2 mL per cartridge; Shipeite; Bausch Freda, Shandong, China) in a cycle of five weekly one-needle arthrocentesis (one per week) of both the superior and inferior TMJ spaces, combined with oral GH tablets (0.24 g per tablet; Bumaixin; Xinsidun Pharmaceutical Co. Ltd, Sichuan, China), with 0.48 g per treatment three times a day after meals for three months. The inclusion criteria were that the patient: was aged 18-70 years; had a diagnosis of TMJ OA based on the Chinese version of the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD Axis I group IIIb) [14]; and provided his/her written informed consent. The exclusion criteria were that the patient: had no diagnosis of TMJ OA, has a rheumatic disease; was allergic to HA or GH; had taken any medication in the past four weeks that may affect the HA or GH treatment or assessment; had participated in another clinical trial in the past three months; had severe cardiovascular, hepatic, nephritic, or systemic blood disease; or could not be followed-up regularly.

Injection technique

The preauricular area of the face was disinfected with povidone iodine and ethanol. A 5 mL syringe containing 4 mL of 2% lidocaine and a 22-gauge needle were used for the joint injection. The entry point of the needle was located at about 10 mm in front of the tragus. After insertion, the needle went deeper into joint space anteriorly, superiorly, and medially until the tip of the needle reached the glenoid fossa of the superior joint space. 2% lidocaine (1 mL) was then injected and aspirated in order to anesthetize and wash out the space. The 5 mL syringe was then removed, and an ampoule containing 0.5 mL of HA was connected to the needle in situ and then HA was injected into the joint space. The ampoule was removed and a new syringe of 2% lidocaine was connected to the needle in situ. The operator then moved the needle to the inferior joint space until the condyle head was reached. The patient was instructed to open his or her mouth to an incisal distance of 1 cm, while the operator moved the needle posteromedially to enter the inferior joint space along the posterior surface of
the condylar head. Another 1 mL of 2% lidocaine was then injected with a new syringe and aspirated to anesthetize and wash out the inferior space. Then 0.5 mL of HA was injected into the inferior joint space. The patient was then instructed to move his or her lower jaw actively without manipulation by the operator.

**OHRQoL**

OHRQoL was assessed with the Chinese version of the 14-item Oral Health Impact Profile (OHIP-C14), whose psychometric properties has been assessed in healthy Chinese population [15]. OHIP-C14 is a short version of the Oral Health Impact Profile [16]. OHIP-C14 has seven domains including functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Each domain has two items. Each item of the OHIP-C14 is scored from 0 to 4: 0 = never; 1 = hardly ever; 2 = occasionally; 3 = fairly often; and 4 = very often. The OHIP-C14 sum score ranges from 0 to 56, and the score of each domain ranges from 0 to 8. A higher OHIP-C14 sum score represents lower OHRQoL.

OHRQoL was assessed at baseline before the HA injection at the first visit (T0), and first month (T1), third month (T2), and sixth month (T3) after the first injection.

**Statistical analysis**

A nonparametric analysis was used to explore OHRQoL changes after arthrocentesis with HA injections combined with oral GH, because the data of OHRQoL followed a Poisson distribution. Friedman two-way analysis of variance (ANOVA) was used to assess the overall changes of both sum scores and domain scores of the OHIP-C14 across different time points. Then, the Wilcoxon signed rank test was used to compare both sum scores and domain scores of the OHIP-C14 at T1, T2, and T3 separately with the sum score and domain score of the OHIP-C14 at T0. The Wilcoxon signed rank test was also used to assess the changes in the sum scores and domain scores of the OHIP-C14 between T2 and T1 and between T3 and T2. A one-sample t test then was used to compare the sum scores of the OHIP-C14 at T0, T1, T2, and T3 with the norms of the OHIP-C14 (11.89). The Kruskal-Wallis test was used to compare
the changes in the sum scores of the OHIP-C14 between baseline (T0) and the final follow-up (T3) in the three age groups (< 45 years, 45-60 years, and > 60 years). The Nemenyi test was used to compare any two age groups at the same time point in order to identify the age group(s) in which OHRQoL changed most significantly. Finally, the Wilcoxon signed rank test was used again to compare the changes in the sum scores of the OHIP-C14 between T0 and T3 for both males and females in order to test whether the treatment differed significantly between genders in improving OHRQoL. The significance level was set at P < 0.05 for all statistical procedures.

Results

Of the 286 adults investigated, 234 adults met the inclusion criteria and were enrolled in the study and 211 adults completed the OHRQoL assessment at all four time points, comprising 90.2% of the original 234 subjects. The median age of the subjects was 34 years (interquartile range, 20-48), and 17.5% (37/211) were male. There was no significant difference in the OHIP-C14 scores at baseline between patients who completed the follow-up assessments of OHRQoL (who were included in the study) and those who did not complete the follow-up assessments of OHRQoL (who were excluded from the study) (P > 0.05).

The outcomes showed significant changes in OHRQoL across time points. Significant overall changes were observed in the sum scores and all the seven domain scores of the OHIP-C14 across different time points (P < 0.001) (Table 1 and Fig. 1). The sum scores of the OHIP-C14 at T1, T2, and T3 were all significantly lower than the sum score at T0 (P < 0.001) (Table 2). Also, the scores of all the seven domains of the OHIP-C14 at T1, T2, and T3 were all significantly lower than those at T0 (Table 2). Besides, the OHIP-C14 sum scores were significantly decreased from T0 to T1 (P < 0.001) and from T1 and T2 (P < 0.001), but not from T2 and T3 (P = 0.369) (Table 3). The changes of the seven domain scores of the OHIP-C14 between the adjacent time points were also presented in Table 3. The OHIP-C14 sum scores were significantly higher than the Chinese norms (11.98) at T0 (P < 0.001), were not significantly different at T1 (P = 0.482) and were significantly lower at T2 (P = 0.013) and T3 (P = 0.003). When age was considered, the OHIP-C14 sum scores of the three age groups at
baseline were not significantly different (P = 0.067). At the final follow-up (T3), the youngest patients had the lowest OHIP-C14 sum scores, whereas the other two groups (45-60 years and > 60 years) had similar sum scores. In general, OHRQoL improvement was more evident in patients < 45 years old when arthrocentesis with HA injections with oral GH were administered (Table 4 and Fig. 2).

When gender was considered, the outcomes did not differ significantly between the male and female patients at baseline (P = 0.920) or at the final follow-up (T3) (P = 0.673). In general, males and females showed similar improvement in OHRQoL when treated with HA injections and oral GH (Table 4 and Fig. 3).
Fig. 1. Mean OHIP-C14 sum scores and domain scores at four time points. A: mean sum scores; B-H: mean scores for domains 1-7, respectively.

Fig. 2. Mean OHIP-C14 sum scores for the three age groups at four time points.

Fig. 3. Mean OHIP-C14 sum scores for male and female groups at four time points.
### Table 1: Comparison of relative changes in OHRQoL at different time points during treatment (N=211)

<table>
<thead>
<tr>
<th></th>
<th>T0</th>
<th>T1</th>
<th>T2</th>
<th>T3</th>
<th>Mean</th>
<th>SD</th>
<th>Median</th>
<th>IQR</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>OHIP-C14</strong></td>
<td>oral health related quality of life</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Function limitation</strong></td>
<td>2.09</td>
<td>2.15</td>
<td>2.00</td>
<td>2.26</td>
<td>2.09</td>
<td>2.15</td>
<td>2.00</td>
<td>2.26</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Physical pain</strong></td>
<td>3.81</td>
<td>1.98</td>
<td>4.00</td>
<td>3.00</td>
<td>3.81</td>
<td>1.98</td>
<td>4.00</td>
<td>3.00</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Psychological discomfort</strong></td>
<td>2.33</td>
<td>1.93</td>
<td>2.00</td>
<td>2.00</td>
<td>2.33</td>
<td>1.93</td>
<td>2.00</td>
<td>2.00</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Physical disability</strong></td>
<td>2.42</td>
<td>2.05</td>
<td>2.00</td>
<td>2.00</td>
<td>2.42</td>
<td>2.05</td>
<td>2.00</td>
<td>2.00</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Psychological disability</strong></td>
<td>2.26</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>2.26</td>
<td>2.00</td>
<td>2.00</td>
<td>2.00</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td><strong>Social disability</strong></td>
<td>1.64</td>
<td>1.63</td>
<td>2.00</td>
<td>2.00</td>
<td>1.64</td>
<td>1.63</td>
<td>2.00</td>
<td>2.00</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

**OHIP-C14:** the Chinese version of the 14-item Oral Health Impact Profile; **IQR:** interquartile range; **SD:** standard deviation; **T0:** at the baseline before the HA injection at the first visit; **T1:** at first month after the first injection; **T2:** at third month after the first injection; **T3:** at sixth month after the first injection.
<table>
<thead>
<tr>
<th></th>
<th>T1-T0</th>
<th>T2-T0</th>
<th>T3-T0</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean  SD</td>
<td>Median  IQR</td>
<td>P    Mean  SD</td>
</tr>
<tr>
<td>OHIP-C14 summary</td>
<td>-6.79 7.07</td>
<td>-7.00 6.00</td>
<td>&lt;0.001 -8.42 7.91</td>
</tr>
<tr>
<td>Function</td>
<td>-0.73 1.55</td>
<td>0 2.00 &lt;0.001</td>
<td>-0.86 1.72 0</td>
</tr>
<tr>
<td>Physical pain</td>
<td>-1.74 1.82</td>
<td>-2.00 2.00 &lt;0.001</td>
<td>-2.02 2.02 -2.00 2.00</td>
</tr>
<tr>
<td>Psychological discomfort</td>
<td>-1.31 1.98</td>
<td>-1.00 3.00 &lt;0.001</td>
<td>-1.59 2.07 -2.00 3.00</td>
</tr>
<tr>
<td>Physical disability</td>
<td>-0.82 1.56</td>
<td>0 2.00 &lt;0.001</td>
<td>-1.07 1.68 -1.00 2.00</td>
</tr>
<tr>
<td>Psychological disability</td>
<td>-0.90 2.17</td>
<td>-1.00 3.00 &lt;0.001</td>
<td>-1.15 2.31 -1.00 3.00</td>
</tr>
<tr>
<td>Social disability</td>
<td>-0.81 1.61</td>
<td>0 2.00 &lt;0.001</td>
<td>-1.17 1.74 -1.00 2.00</td>
</tr>
<tr>
<td>Handicap</td>
<td>-0.54 1.42</td>
<td>0 1.00 &lt;0.001</td>
<td>-0.65 1.43 0 2.00 &lt;0.001</td>
</tr>
</tbody>
</table>

**OHIPQoL**: Oral health related quality of life; **OHIP-C14**: the Chinese version of the 14-item Oral Health Impact Profile; **IQR**: interquartile range; **SD**: standard deviation; **T0**: at the baseline before the HA injection at the first visit; **T1**: at first month after the first injection; **T2**: at third month after the first injection; **T3**: at sixth month after the first injection.
### Table 3: Changes in OHRQoL between adjacent treatment times (N=211)

<table>
<thead>
<tr>
<th></th>
<th>T1-T0</th>
<th>T2-T1</th>
<th>T3-T2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean SD</td>
<td>Median IQR</td>
<td>P</td>
</tr>
<tr>
<td><strong>OHIP-C14 summary</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Function limitation</td>
<td>-0.73 1.55 0 2.00 &lt;0.001</td>
<td>-0.13 1.05 0 1.00 0.115</td>
<td>-0.07 0.84 0 0</td>
</tr>
<tr>
<td>Physical pain</td>
<td>-1.74 1.82 -2.00 2.00 &lt;0.001</td>
<td>-0.27 1.64 0 3.00 0.100</td>
<td>-0.08 1.34 0 2.00 0.426</td>
</tr>
<tr>
<td>Psychological discomfort</td>
<td>-1.31 1.98 -1.00 3.00 &lt;0.001</td>
<td>-0.27 1.56 0 2.00 0.012</td>
<td>-0.22 1.32 0 2.00 0.029</td>
</tr>
<tr>
<td>Physical disability</td>
<td>-0.82 1.56 0 2.00 &lt;0.001</td>
<td>-0.25 1.27 0 1.00 0.001</td>
<td>0.00 0.93 0 1.00 0.865</td>
</tr>
<tr>
<td>Psychological disability</td>
<td>-0.90 2.17 -1.00 3.00 &lt;0.001</td>
<td>-0.17 1.24 0 1.00 0.058</td>
<td>-0.03 1.04 0 0</td>
</tr>
<tr>
<td>Social disability</td>
<td>-0.81 1.61 0 2.00 &lt;0.001</td>
<td>-0.36 1.26 0 1.00 &lt;0.001</td>
<td>-0.09 0.96 0 0</td>
</tr>
<tr>
<td>Handicap</td>
<td>-0.54 1.42 0 1.00 &lt;0.001</td>
<td>-0.12 1.01 0 1.00 0.104</td>
<td>0.10 0.88 0 0</td>
</tr>
</tbody>
</table>

OHRQoL: Oral health related quality of life; OHIP-C14: the Chinese version of the 14-item Oral Health Impact Profile; IQR: interquartile range; SD: standard deviation; T0: at the baseline before the HA injection at the first visit; T1: at first month after the first injection; T2: at third month after the first injection; T3: at sixth month after the first injection.
| Ages      | T0 Mean | T0 SD  | T0 Median | T0 IQR | T0 P  | T3 Mean | T3 SD  | T3 Median | T3 IQR | T3 P  | T0-T3 Mean | T0-T3 SD | T0-T3 Median | T0-T3 IQR | T0-T3 P  |
|-----------|---------|--------|-----------|--------|-------|---------|--------|-----------|--------|-------|------------|----------|--------------|----------|-------|--------|
| A (<45)   | 18.46   | 7.76   | 18.00     | 10.00  | 0.067 | 9.24    | 5.27   | 9.00      | 6.00   | 0.001| 9.21       | 7.66     | 9.00         | 9.00     | 0.001|
| B (45-60) | 22.19   | 11.15  | 20.00     | 17.00  | 14.28 | 8.77    | 12.00  | 12.00     | 7.91   | 9.99 | 8.00       | 13.00    | A-B: 0.935    |
| C (>60)   | 16.87   | 10.98  | 14.00     | 11.00  | 12.67 | 8.01    | 11.00  | 13.00     | 4.20   | 4.78 | 3.00       | 6.00     | A-C: 0.011    | B-C: 0.036|
| Genders   | D (male)| 19.00  | 8.46      | 18.00  | 11.00 | 0.920   | 9.38   | 4.39      | 9.00   | 7.00 | 0.673      | 9.62     | 7.36         | 9.00     | 10.50| 0.293  |
| E (female)| 19.21  | 9.10   | 18.00     | 11.25  | 10.87 | 7.11    | 9.00   | 7.00      | 8.34   | 8.32 | 8.00       | 10.00    |              |

OHIP-C14: the Chinese version of the 14-item Oral Health Impact Profile; IQR: interquartile range; SD: standard deviation; T0: at the baseline before the HA injection at the first visit; T3: at sixth month after the first injection.
Discussion

TMD is defined as a group of heterogeneous pains and dysfunctions involving the masticatory system. Common signs and symptoms include facial and jaw pain, clicking or crepitus of the joints, restricted mandibular movement, and deviation on opening [15]. According to a systematic review, TMD has a negative effect on the quality of life [8].

OA is a common type of TMD encountered clinically. The main characteristics of TMJ OA is degeneration of the bone, cartilage, and supporting tissues of TMJs [12,13]. It is caused by both mechanical and biological events that make the normal coupling of the degradation and synthesis of the articular cartilage and subchondral bone imbalanced [13]. TMJ OA is caused by trauma, including macrotrauma and repetitive microtrauma, or a rare infective arthritis disease [16]. Patients with TMJ OA always complain of jaw pain [16]. In other words, as a component of TMDs, TMJ OA can negatively affect a patient’s normal life.

The high response rate in our study shows the clinical feasibility of measuring patient-centred OHRQoL. Evaluating OHRQoL helps us to understand the effects of the treatment on patients’ feelings, because these effects are important when the overall effectiveness of the arthrocentesis with HA injections and oral GH was assessed. Various OHRQoL instruments have been developed in the past 20 years due to the increased concern about the impact of oral health on individuals’ quality of life [8]. OHIP, developed and evaluated by Slade and Spencer, is one of the most widely used instruments for OHRQoL [17]. OHIP is widely used in dentistry to assess OHRQoL in patients with TMDs and has proved to be sensitive in these patients [18,19]. OHIP has been translated into several languages and has two major versions, OHIP-49 and OHIP-14 [18,19]. We used OHIP-C14, which is widely used in dentistry in China because it is concise and practicable for evaluating OHRQoL. OHIP-C14 has been shown to have high reliability and validity in Chinese population. In a study of 550 healthy volunteers aged 18-65 years, Cronbach’s alpha for the OHIP-C14 was 0.93, and the corrected item total correlation ranged from 0.53 to 0.71, so the OHIP-C14 scores were significantly associated with the perceived oral health status and the perceived need for dental care [15]. The good psychometric properties of the OHIP-C14 provide theoretical support for its further application to the Chinese population [15]. It should be noted that the Chinese norm was determined in 550 Chinese volunteers.
selected randomly from a community in southern China with good oral health, with no consideration of age, sex, economic level, social status, or education level [15]. The Chinese version of RDC/TMD, which has been proved to have high reliability and validity in Chinese TMDs patients, was used to diagnose TMJ OA in the present study. Cronbach’s alpha for the Chinese version of RDC/TMD was 0.93, the split-half coefficient was 0.71, and there was a significant logical correlation in the scale [14].

Significant changes in OHRQoL were found in this study in both the short term (one month and three months) and long term (six months) after arthrocentesis with HA injections combined with oral GH in TMJ OA patients. Compared with the pretreatment scores, the OHIP-C14 showed improvements in OHRQoL at T1, T2, and T3. When compared with the Chinese norms for OHRQoL assessed with OHIP-C14, the outcomes showed that the TMJ OA patients had significantly worse OHRQoL than the normal population before treatment (T0), so TMJ OA had a negative effect on patient OHRQoL. OHRQoL was significantly improved to the normal level at T1 and was even superior to that of the normal population at T2 and T3. OHRQoL was better at T2 than at T1, and there was no significant difference between T2 and T3, so the treatment had excellent and stable effects on the OHRQoL of TMJ OA patients in both the short and long terms.

In terms of the domains, the seven domains all showed better OHRQoL at T1, T2, and T3 than those at T0. Furthermore, the domains of physical pain, psychological discomfort, physical disability, and social disability were improved at T2 relative to T1. Compared with T2, psychological discomfort was improved at T3. Thus, arthrocentesis with HA injections with oral GH were useful for TMJ OA patients in both the short and long term, especially in terms of their psychological discomfort, which improved continuously within the six months after the first injection.

HA injections together with oral GH seemed to improve OHRQoL more strongly in the youngest group than in the middle-aged and oldest groups, but OHRQoL improvement did not differ significantly between males and females. It should be noted that according to the WHO, the definition of “elderly” is individuals aged > 65 years. However, citizens aged > 60 years are defined as elderly people in China, which is a developing country and has a shorter average life expectancy than developed countries. Therefore, in this study, we used 60 years to delimit the elderly group.
These outcomes might be explicable when the pharmacological and clinical effects of the treatments are considered. HA is a natural component of the synovial fluid in TMJs [20]. The mechanical function of HA is to lubricate joint and prevent joint from wearing secondary to adhesions [20]. Also, HA can alleviate jaw pain by reducing the levels of inflammatory mediators in the joint, and HA has a positive effect on joints even when the HA itself has been metabolized [20,21]. However, the mechanism of HA in improving joint disease is not entirely clear. Glucosamine, as a component of the cartilage matrix of TMJs, can improve pain and disability of OA patients by supplying the components for cartilage repair [10]. In a Cochrane systematic review, glucosamine was shown to be superior to a placebo for pain alleviation and joint function, and that glucosamine was as safe as the placebo [22]. However, the active mechanism of glucosamine is also unknown, and until now, glucosamine has always been used for knees and hips, and seldom for TMJ. Some experimental studies have assessed the effectiveness of HA injections in treating intra-articular derangements in animals [23] and several clinical trials have reported that HA can reduce OA symptoms and maintain improvements over time [24,25]. A randomized controlled trial reported that HA injections combined with oral GH was more effective in treating TMJ OA patients than HA injections without oral GH [26]. HA injections with oral GH have also shown satisfactory safety [26]. Therefore, HA combined with oral GH might be better than HA injections alone in improving the symptoms, clinical signs, and overall condition of TMJ OA, and might explain why OHRQoL improved during follow-up in the present study. TMJ OA patients were advised to take oral GH for three months after first injection, so the action of GH and the long-term effects of HA mentioned above might explain the improvement in OHRQoL from T2 to T3. According to the principles of health-related quality of life defined by WHO [27], when physiological health improves, psychological health improves in response. After both physiological health and psychological health improve, the capacity for social communication and social adaptation improves, with subsequent improvement in social disability. That may be why after the treatment, all the domains of OHRQoL of the patients with TMJ OA, including physical, psychological and social aspects of OHRQoL, improved in the present study. The course of TMJ OA might be shorter and less severe for younger individuals, so their condition might be more easily improved after receiving treatments.
However, the course of TMJ OA might be longer for middle-aged and old groups, so their conditions might be more severe, and the regeneration of the local cartilage and tissues and the absorption of pharmaceutical products might be slower and more difficult, so their symptoms might be more refractory to treatment. That might explain why arthrocentesis with HA injections with oral GH improved OHRQoL better in the young group than in the middle-aged and elderly groups.

This study was not free of limitations. First, the study followed an observational design and was not randomized controlled trial. It may be better to compare the changes in OHRQoL between a treated group and a no-treatment group (control group). However, no-treatment group may be questionable in ethnics. Second, the sample is limited in generalizability of the findings in other types of TMDs. Third, OHRQoL is a relative concept instead of an absolute concept [28], so assessment of OHRQoL is merely the reflection of patients’ subjective experiences and feelings. Although we identified significant changes in OHRQoL of patients with TMJ OA in this study, it is unclear whether those changes were clinically significant.

We hope that more high-quality clinical trials which focus on the efficacy and safety of arthrocentesis with HA injections combined with oral GH for TMJ OA patients will be undertaken to further evaluate the utility of this treatment.

Conclusion

TMJ OA has a negative effect on OHRQoL of patients with TMJ OA. Changes in OHRQoL occurred during the follow-up after arthrocentesis with HA injection combined with oral GH. This treatment greatly improved OHRQoL of patients with TMJ OA. OHRQoL of the patients reached the levels of the healthy Chinese population in both short and long terms. The treatment improved OHRQoL more effectively in the young group of patients than in the middle-aged and elderly groups, but was equally effective in improving OHRQoL in males and females.
CHAPTER 1

Patients profiles and outcomes of care in temporomandibular disorders

References


