Patients profiles and outcomes of care in temporomandibular disorders

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CHAPTER 9

Summary

The present thesis increases the currently available knowledge about patient profiles and outcomes of care in temporomandibular disorders (TMDs) and can be helpful to clinicians for decision-making in clinical practice. This chapter aims to present a brief chapter-to-chapter summary of the studies included in this thesis.

In ***Chapter 2***, Oral health related quality of life (OHRQoL) of patients with Temporomandibular joint osteoarthritis (TMJ OA) was assessed, and patients were treated with arthrocentesis with hyaluronic acid (HA) injections (once a week for 5 subsequent weeks) together with oral glucosamine hydrochloride (GH) (0.48g per time and three times per day for three months) in order to determine whether their OHRQoL would improve. The study included 211 consecutive patients who had the diagnosis of TMJ OA based on the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) and completed five weekly arthrocentesis with HA injections together with three monthly oral GH. The included patients completed the Chinese version of the 14-item Oral Health Impact Profile (OHIP-C14) at baseline (T0), and one month (T1), three months (T2), and six months (T3) after the first injection. The study showed that, compared to OHRQoL of the healthy Chinese population, OHRQoL of TMJ OA patients at baseline was significantly lower. Compared to OHRQoL at baseline, OHRQoL significantly improved at T1, T2, and T3. Also, OHRQoL significantly improved from T0 to T1 and from T1 to T2, but not from T2 to T3. Therefore, it was concluded that TMJ OA has a negative effect on patients' OHRQoL, and that arthrocentesis with HA injections combined with oral GH was beneficial to improve patients' OHRQoL. The maximal effect of the treatment on OHRQoL was reached at three months after the first injection. Therefore, arthrocentesis with HA injections with oral GH can be regarded as an effective treatment option for patients with TMJ OA. Future studies could further explore whether arthrocentesis with HA injections alone or combined with oral GH is more effective for the improvement of OHRQoL in patients with TMJ OA.

In ***Chapter 3***, we assessed the association between OHRQoL and the severity of TMD signs and symptoms measured with the Helkimo clinical dysfunction index (HDI) in patients with TMJ OA. The study included 541 patients with TMJ OA diagnosed with the RDC/TMD. The relevant clinical data and scores of the OHIP-C14 of the included patients were recorded. Each patient was assigned an HDI sum score ranging from 1 to 25 covering five domains: TMJ function impairment, muscle tenderness during pal-

pation, TMJ pain during mandibular movement, impaired range of mandibular mobility, and TMJ pain during palpation. Higher sum scores of the HDI represent more severe signs and symptoms. The patients were classified into three categories based on the HDI sum scores. Higher categories indicated higher sum scores of the HDI and therefore more severe TMJ OA. Separate Spearman rank correlation tests were used to assess the associations of HDI sum scores/categories with the OHIP-C14 sum scores; HDI domain scores with the OHIP-C14 sum scores; the OHIP-C14 domain scores with HDI sum scores/categories; and HDI domain scores with the OHIP-C14 domain scores. The results showed that HDI sum scores/categories were positively associated with the sum score of the OHIP-C14. The domain scores for all HDI domains except TMJ function impairment were significantly associated with the sum score of the OHIP-C14. The domain scores for all the seven domains of the OHIP-C14 were significantly associated with HDI sum score/categories. Several significant correlations were found between HDI domain scores and the OHIP-C14 domain scores. Therefore, we concluded that the severity of signs and symptoms was significantly associated with OHRQoL of patients with TMJ OA. Compared with function-related HDI domains, pain-related HDI domains were more strongly inversely associated with OHRQoL. This study confirms previous evidence that pain is the key factor that affects OHRQoL in TMD patients.

In ***Chapter 4***, we developed prediction models for low OHRQoL in patients with TMJ OA at 1-month and 6-month after arthrocentesis with HA injections (once a week for 4 subsequent weeks). The cohort study involved 522 patients diagnosed with TMJ OA at baseline, while 510 and 463 patients were included in the 1-month and 6-month follow-up, respectively. Patients' history and characteristics, clinical examinations, and questionnaires were recorded at the start of treatment as potential predictors. Patients' OHRQoL was assessed by the OHIP-C14. Patients' OHRQoL at baseline was also used as one of the potential predictors, while patients' OHRQoL assessed at 1 and 6 months after completing arthrocentesis with HA injections were regarded as the endpoints. For this analysis, OHRQoL was dichotomized as "low" or "normal". Multivariable binary logistic regression analyses were used to develop the prediction models for low OHRQoL for both follow-up. The internal validity, calibration, discrimination, and clinical values of the models were assessed. In the final model

for low OHRQoL at 1-month follow-up, we identified the presence of a history of mental diseases, a smaller distance of maximal mandibular protrusion, more severe muscle and joint pain with palpation, the presence of awake bruxism, the presence of chewing-side preference, and low OHRQoL at baseline as independent predictors. In the final model for low OHRQoL at 6-month follow-up, we identified older age, the presence of the pain in other joints, the presence of a history of mental diseases, more severe joint pain with palpation, the presence of sleep bruxism and of awake bruxism, the presence of chewing-side preference, and low OHRQoL at baseline as independent predictors. The results of the study showed that both logistic regression models had a good internal validity, reasonable calibration, and good discrimination. Besides, the two models both had sufficient added values at the cutoffs of predicted probability for both ruling in and ruling out the risk of low OHRQoL in patients with TMJ OA. For practical use, the prediction models were converted into score charts and line charts. The models can provide clinicians with information for decisions at an individual patient's first visit on whether a low OHRQoL is to be expected one and six months after arthrocentesis with HA injections.

In ***Chapter 5***, we assessed whether pain intensity and pain-related disability are associated with psychological and socio-demographic factors including somatization, depression, stress, anxiety, daytime sleepiness, optimism, age and gender in TMD patients diagnosed with the Diagnostic Criteria for Temporomandibular Disorders (DC/TMD). In total, 320 TMD patients were involved in the study. The psychological wellbeing of each patient was assessed using questionnaires including the Generalized Anxiety Disorder (GAD-7) questionnaire for anxiety, the 15-item Patient Health Questionnaire (PHQ-15) for somatization, the 9-item Patient Health Questionnaire (PHQ-9) for depression, the 7-item stress questionnaire for psychological stress, the Epworth Sleeping Scale (ESS) for chronic daytime sleepiness, and the Life Orientation Test-Revised (LOT-R) for optimism. TMD pain intensity and pain-related disability were assessed with the Graded Chronic Pain Scale (GCPS). Two separate multivariable logistic regression analyses were performed to assess the associations of psychological and socio-demographic factors with TMD pain intensity and pain-related disability, respectively. The results of the two multivariable logistic regression analyses after backward selection of the included predictors showed that pain intensity was only significantly associated with somatization,

while pain-related disability was only significantly associated with depression. The associations of pain intensity with somatization and of pain-related disability with depression were both positive. So, among the psychological and socio-demographic factors, somatization played a dominant role in the prediction of pain intensity while depression played a dominant role in the prediction of pain-related disability. The results confirm earlier findings that chronic pain is associated with psychological factors in TMD patients. For clinicians, this means that TMD patients with more severe orofacial pain (in terms of intensity and disability) are more likely to have somatization or depression. Hence, in clinical practice, clinicians should be attentive to the possible influence of the psychological status of these patients on the severity of their complaints, and provide psychological support for them if necessary.

In ***Chapter 6***, we identified which potential predictors in patient profiles are significantly associated with the types of treatment indicated for patients with TMDs, and developed a prediction model for types of treatments indicated for future TMD patients in clinical practice. The derivation cohort at baseline involved 356 adult patients with TMDs diagnosed with the DC/TMD. Patient characteristics and disease characteristics at baseline were recorded as the potential predictors of the model. Types of treatments that were indicated for TMD patients based on the consensus in a multidisciplinary team were the endpoint of the model. The types of treatments were classified into no treatment (NT), physical treatment only (PTO) and combined physical and psychological treatment (CPPT). Multivariable multinomial logistic regression analyses were used to develop the prediction model. The internal validation, calibration, discrimination, and external validation were determined. In the final model, age, anxiety, sleep bruxism, pain-related TMD, function-related TMD with treatment needed, gender, stress, stretch of assisted mandibular opening, and depression were the significant predictors in the model for the types of treatment indicated for TMD patients. The results of the study showed that the model had a good internal validity, reasonable calibration, good discrimination and acceptable external validity. For practical use, the prediction model was converted into score charts and line charts. The model provides information on the patient profiles that relate to types of treatment indicated and provides guidance for clinicians, especially novices, junior clinicians, and solo clinicians when they make decisions on which treatment is indicated for a TMD patient.

In ***Chapter 7***, we assessed the added diagnostic value of ultrasonography (US) for detecting the presence or absence of disc displacements (DDs) in TMJs based on a systematic review. We used PubMed and EMBASE to search for articles which assessed the diagnostic accuracy of US for the diagnosis of DD with magnetic resonance imaging (MRI) as the gold standard. Quality Assessment of Diagnostic Accuracy Studies-2 (QUADAS-2) was used to assess the methodological quality of each included article. Meta-analyses were performed with Metadisc 1.4 and Revman 5.3. Finally, a total of 16 studies qualified for meta-analysis. The diagnostic added values of US for ruling in and ruling out the presence of a DD at closed mouth position (DD-CM), DD at maximum mouth opening position (DD-MMO), DD with reduction, and DD without reduction were all sufficient. In the subtype analyses, the added values of combined static and dynamic examination of US for ruling in and ruling out DD-CM and DD-MMO tended to be higher than that of static examination alone. Also, the added values of high-resolution US for ruling in and ruling out DD-CM and DD-MMO are higher than that of low-resolution US. Therefore, using MRI as the reference standard, the added value of US for ruling in and ruling out DD is sufficient for its use in the decision-making in dental practice. US can be considered as a useful imaging tool to supplement clinical examination in patients with suspected DDs in selected cases. Combined static and dynamic examinations using high-resolution US are to be preferred.

In conclusion, the thesis showed that TMJ OA has a negative effect on patients' OHRQoL. OHRQoL is significantly associated with patients' clinical symptoms and signs. Arthrocentesis with HA injections combined with oral GH is effective to improve OHRQoL of patients with TMJ OA. The two prediction models for low OHRQoL in patients with TMJ OA at 1-month and 6-month after arthrocentesis with HA injections both showed good internal validity, calibration, and discrimination and showed sufficient added values in clinical use. Besides, for TMD patients, somatization played a dominant role in the prediction of pain intensity while depression played a dominant role in the prediction of pain-related disability. The prediction model for types of treatments indicated for TMD patients showed good internal validity, calibration, discrimination, and external validity. For patients with DDs, US is considered as a useful imaging tool to supplement clinical examination in patients with suspected DDs.