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# Temporomandibular disorders/myoarthropathy of the masticatory system

## Costs of dental treatment and reimbursement by Swiss federal insurance agencies according to the Health Care Benefits Ordinance (KLV)

Key words: temporomandibular disorder (TMD), myoarthropathy (MAP), Swiss Health Care Benefits Ordinance (KLV), Swiss Federal Health Insurance Act (KVG), splint therapy, physiotherapy

**Summary** The goal of the study was to calculate the direct costs of therapy for patients with MAP.

This retrospective study included 242 MAP patients treated at the Department of Prosthodontics of the University of Bern between 2003 and 2006. The following parameters were collected from the clinical charts: chief complaint, diagnosis, treatment modalities, total costs, costs of the dental technician, number of appointments, average cost per appointment, length of treatment, and services reimbursed by health insurance agencies.

The average age of the patients was 40.4 ± 17.3 years (76.4% women, 23.6% men). The chief complaint was pain in 91.3% of the cases, TMJ noises (61.2%) or limitation of mandibular mobility (53.3%). Tendencyopathy (22.3%), disc displacement (22.4%), or a combination of the two (37.6%) were more often

diagnosed than arthropathy alone (7.4%). Furthermore, 10.3% of the MAP patients had another primary diagnosis (tumor, trauma, etc.). Patients were treated with counseling and exercises (36.0%), physiotherapy (23.6%), or occlusal splints (32.6%). The cost of treatment reached 644 Swiss francs for four appointments spread over an average of 21 weeks.

In the great majority of cases, patients can be treated with inexpensive modalities. 99.9% of the MAP cases submitted to the insurance agencies were reimbursed by them, in accordance with Article 17d1-3 of the Swiss Health Care Benefits Ordinance (KLV) and Article 25 of the Federal Health Insurance Act (KVG). The costs of treatment performed by dentists remain modest. The more time-consuming services, such as providing information, counseling and instructions, are poorly remunerated. This aspect should be re-evaluated in a future revision of the tariff schedule.

## Introduction

In terms of diagnosis and treatment, myoarthropathy of the masticatory system (MAP) represents an interface between dentist and physician. In general, the patient's health insurance covers those costs of dental treatment which are caused by an unavoidable disease/disorder of the masticatory system.

This is regulated by the Swiss Federal Health Insurance Act (KVG) (Art. 31 KVG, Tab. I), on the condition that the degree of suffering is sufficient to be classified as a disease. The cost of treatment is assumed by the insurance only to the extent commensurate to the severity of the disease. A concluding list in Articles 17 to 19 of the Swiss Health Care Benefits Ordinance (KLV) regulates the obligatory benefits to be paid by the health

insurance agencies. Articles 17d1-3 of the KLV pertain to myoarthropathic disorders of the masticatory system (Tab. II). Similarly, Article 25 of the Swiss Federal Health Insurance Act applies to cases in which the physician refers the patient to a

third party who provides the service(s) ordered by the physician (Tab. III).

Myoarthropathy of the masticatory system, also known as temporomandibular dysfunction (TMD), encompasses disor-

**Tab.I Article 31 KVG: Treatments performed by dentist**

The obligatory Health Care Benefits Ordinance (KLV) covers the costs of treatment performed by a dentist if it:

- a is necessitated by a severe, unavoidable disease of the masticatory system; or
- b. is necessitated by a severe general disease or its consequences; or
- c. is necessary for treating a severe general disease or its consequences.

It also covers the costs of treating damage to the masticatory system caused by an accident as defined in Article 1 paragraph 2 letter b.

**Tab.II Article 17 KLV: Diseases/disorders of the masticatory system. Insurance assumes the costs of dental treatment necessitated by one of the following severe, unavoidable diseases/disorders of the masticatory system (Art. 31 paragraph 1 letter a KVG) on the condition that the degree of suffering is sufficient to be classified as a disease; the cost of treatment is assumed by the insurance only to the extent made necessary by the severity of the disease.**

<b>17a</b>	<b>Diseases/disorders of the teeth:</b>
17a1	Idiopathic internal tooth granuloma
17a2	Disease caused by superimposed and supernumerary teeth and tooth germs (e.g., abscesses, cysts)
<b>17b</b>	<b>Periodontal diseases:</b>
17b1	Pre-pubertal periodontitis
17b2	Juvenile, progressive periodontitis
17b3	Irreversible side-effects of medications
<b>17c</b>	<b>Diseases of maxillofacial bone and/or soft tissues:</b>
17c1	Benign tumors in jaw and mucous membrane areas and tumor-like dysplasias
17c2	Malignant tumors in maxillofacial and neck area
17c3	Osteopathy of maxilla and/or mandible
17c4	Cysts (without involvement of dental elements)
17c5	Osteomyelitis of maxilla and/or mandible
<b>17d</b>	<b>Diseases/disorders of the temporomandibular joint and musculoskeletal system:</b>
17d1	TMJ arthrosis
17d2	Ankylosis
17d3	Condyle and disc luxation
<b>17e</b>	<b>Diseases of the maxillary sinus:</b>
17e1	Teeth or parts thereof dislocated into the maxillary sinus
17e2	Mouth-antrum fistula
<b>17f</b>	<b>Dysgnathia leading to the following disorders/diseases:</b>
17f1	Sleep apnea syndrome
17f2	Severe dysphagia
17f3	Severe craniofacial asymmetries

**Tab.III Art. 25 KVG: General benefits paid upon illness**

1	The obligatory Health Care Benefits Ordinance (KLV) covers the costs for those services that support the diagnosis or treatment of an illness/disease.
2	These services include:
a	Examinations, treatments, and care performed on an outpatient basis, during housecalls, on an inpatient or daycare/nightcare basis, or in a nursing facility by: <ul style="list-style-type: none"> <li>1 Physicians</li> <li>2 Chiropractors</li> <li>3 Persons who perform services ordered by a physician</li> </ul>
b	Analyses, medications, and products/equipment which serve the examination or treatment ordered by a physician or – provided certain federal requirements are met – a chiropractor
c	Part of the costs of stays at a medical spa prescribed by a physician
d	Measures of medical rehabilitation performed or prescribed by a physician
e	Hospitalization in the general ward
f	Stay at a daycare/nightcare facility
g	Part of the medically necessary transportation and rescue costs
h	Pharmacist's services in providing prescribed medications as described in letter b

ders which are characterized by pain, dysfunctions, and diseases of the temporomandibular joint and/or the masticatory muscles (PALLA 2002). Epidemiologically, they are the most common cause of facial pain (DRECHSEL & GERBERSHAGEN 1992). Epidemiological studies of maxillofacial pain found a prevalence of ca. 5%–15% in Europe and North America (LERESCHE 1997, VON KORFF ET AL. 1988). Typically, the patients seek treatment from different specialists, since the symptoms can take a variety of forms. Often, the general practitioner or dentist is the first to be confronted with the problem. Various other disciplines and treatment modalities, e. g., physiotherapy, neurology, psychology, psychiatry, maxillofacial surgery, otorhinolaryngology, or alternative medicine may become involved, either on the patient's own initiative or by the general practitioner's or dentist's referral (ETTLIN ET AL. 2007). A comprehensive anamnesis and systematic examination are the most important components of diagnostics and treatment planning. In addition to informing the patient about pathogenesis and progression, instruction in relaxation techniques and muscle exercises at the start of treatment are some of the most important therapeutic steps. The goal is to reach patients early in the acute stage, predominantly in order to avoid central or peripheral sensitization with the risk of chronification. The persistence of symptoms can increase the patient's suffering, worsen the prognosis and thus also increase the treatment costs. It is known that patients with facial pain "wander" on their own from doctor to doctor, seeking a competent specialist (DIMITRIOULIS 1998). Among the most conservative forms of treatment are counseling about the disease/symptoms by dentists and specially trained physiotherapists, in addition to other measures, such as occlusal splints. These are successful in most cases (TRUELOVE ET AL. 2006). Under some circumstances, invasive forms of treatment are performed, such as intra-articular injection of sodium hyaluronate (RESTON & TURKELSON 2003) and corticosteroids (TANAKA ET AL. 2008), or surgery (VALLERAND & HALL 1991), e. g., arthrocentesis, arthroscopy, or arthrotomy with discectomy (NITZAN ET AL. 1997, 1990). In the initial examination, it is expedient to record somatic (axis I) and psychosocial (axis II) parameters, as detailed by DWORKIN & LERESCHE 1992 (TÜRPE ET AL. 2006).

The present study evaluated the symptoms, findings, and treatment costs of MAP patients who were examined and treated at our clinic. Bearing in mind the obligatory coverage provided by the federal health insurance agencies, the purpose was to obtain key figures for the costs of direct dental treatments in the therapy of MAP patients.

## Materials and Methods

### Patients

At the Department of Prosthodontics, University of Bern, a total of 4,053 patients were initially examined over a 4-year period (2003 to 2006). Over 50% received a complex prosthetic rehabilitation, another 20% were treated in the student courses. The remaining patients only needed smaller prostheses or, after consultation, were referred back to their private dentist. From this group of patients and period, the present study analyzed the medical records of all those who presented for the first time with the key symptoms of maxillofacial pain, popping or grating noises in the TMJ area, or limited mouth opening. For all patients, the variables age, sex, self-referral or referral from private dentist, diagnosis, treatment and cost of treatment were documented. The patient pool was divided into three age groups for analysis ( $\leq 18$  years, 19 to 45 years,  $> 45$  years).

### Symptoms and Diagnostics

Inclusion criteria were the following key symptoms, which occurred alone or in combinations:

- Pain (P): in the TMJ area and/or masticatory muscles
- Noises (N): popping and/or grating upon mouth opening
- Limited movements (M): restricted mouth opening or lateral movement of the mandible

Based on these key symptoms, MAP diagnostics were performed, which comprised a differential social, general medical and pain-related anamnesis, clinical findings, and a panoramic radiography (OPT). During the observation period mentioned above, the diagnoses and treatments were always performed under the supervision of an expert in the field. The clinical records used (anamnesis, findings, patient information flyers) served to lend structure to the proceedings, and were oriented toward research criteria (DWORIN & LERESCHE 1992, LASKIN ET AL. 2006) for diagnostics (axis I and axis II). Axis I contains the somatic area of MAP (1. tendomyopathy, 2. joint disorders, 3. arthralgia/arthrosis). In contrast, axis II encompasses the patient's environment, experiences with the disease, and the risk of pain chronification (psychosomatics; 1. experience of pain and handicap, 2. psychosocial environment and stress, 3. degree of suffering, coping skills).

Based on the interview and examinations, the patients were assigned to one of the three axis-I MAP categories, taking the other factors of axis II into consideration.

Additional findings were also recorded, for instance, bruxism (clenching/grinding the teeth, attrition facets) and severe malocclusions such as locked bite or crossbite. Where findings were uncertain, such as suspected fracture or a tumor, patients underwent further diagnostic measures in cooperation with other disciplines.

### Therapy

Therapy always included explanations of possible causes and how problems in the maxillofacial area are interrelated. In acute cases, pain was first treated with analgesics before further treatment was initiated.

Therapy was conducted in the following steps, a through d:

- a. Information, counseling and, if appropriate, instructions for self-training (home exercise program).
- b. In addition to step a, either referral to an external physiotherapist or treatment with an occlusal splint.
- c. In accordance with step b, additional occlusal splint treatment or referral to an external physiotherapist.
- d. Parallel to a, b, c (if indicated): interdisciplinary diagnostics and cooperation with other specialists (neurologists, internists, ENT, pain management).

Therapy was judged to be completed when the patient no longer exhibited symptoms or did not request further follow-ups.

### Costs

The Article of the KVG/KLV applied for assuming costs depended on the medical records. For MAP therapy, primarily Articles 17d1, 17d2, 17d3 KLV and Article 25 KVG were applied. Accordingly, it was possible to separately report all costs covered by the health insurance agencies. The expense was calculated as total costs for all dental services/treatments provided by the clinic. Furthermore, the costs were calculated according to the MAP categories and regarding treatment performed; technician's costs were also reported. The number

of appointments and overall duration of therapy were recorded.

### Statistical Analysis

The data were statistically analyzed using descriptive methods. The groups were compared using the Mann-Whitney U-Test and the Kruskal-Wallis Test. Statistical significance was set at  $p < 0.05$ . All evaluations were performed with the SPSS program (Version 14.0, Chicago, Illinois, USA).

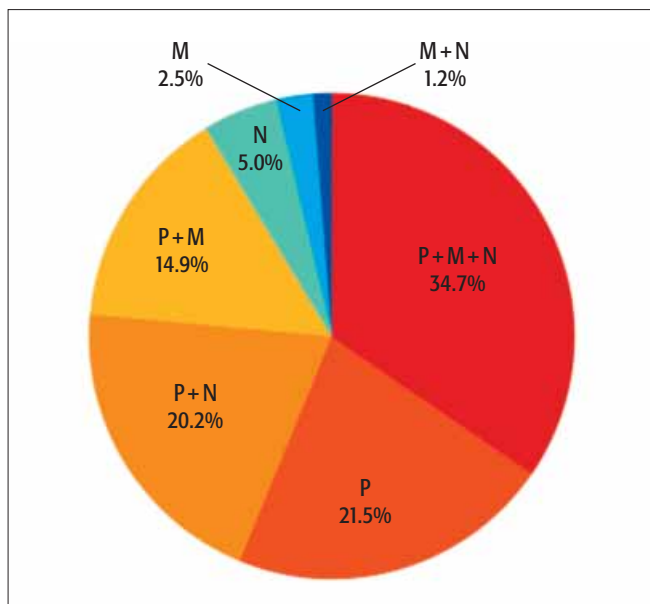
## Results

### Patients

Based on the key symptoms, a total of 242 patients fulfilled the inclusion criteria. Of these, 76% were women and 24% men. The average age was  $40.4 \pm 17.3$  years. 11% of the patients were under 19 years old, 54% were between 19 and 45 years old, and 35% were over 45. Five percent of the patients visited the clinic on their own initiative, and the other 95% were referred.

### Key symptoms

The key symptoms occurred singly or, more often, in combinations. Figure 1 presents an overview of the key symptoms accord-



**Fig. 1** Key symptoms and frequency of occurrence (P = pain in maxillofacial area 91.3%, M = limited mandibular movement 53.6%, N = noises in TMJ 61.1%).

ing to their percent distribution. The patients in the  $\leq 18$  age group had mandibular movement limitations significantly more often than did patients in the age group 19 to 45 years ( $p = 0.019$ ).

### MAP categories

The percent distribution of the MAP categories (axis I) is given in Table IV. There was no significant difference between sexes. Activated arthrosis (9.4%) was significantly more common in the age group  $> 45$  years than in younger patients ( $p < 0.02$ ). In 10.3% of the patients, the MAP diagnosis additionally showed a specific pathological condition, such as jaw fracture, ankylosis, arthritis temporalis, tension headaches, lymphadenitis, tumors, and chronic, generalized pain (axis II). These "other diagnoses" were significantly more frequent among men ( $p = 0.011$ ).

### Therapy and cost analysis

The dental treatment performed for all 242 patients amounted to an average of 644 CHF (Swiss francs) per patient. The federal health insurance agencies covered total costs of an average of 982 CHF per patient for 105 of 106 patients (Tab. V) who had confirmation of coverage (obligatory coverage according to KVG/KLV). In contrast, the out-of-pocket costs per patient without obligatory coverage according to KVG amounted to an average of 385 CHF. These cases were not reported to the health insurer because 1) no obligatorily covered disease was diagnosed (disc displacement with repositioning), 2) some patients did not wish it to be reported (franchise), or 3) treatment was possible at little expense. The coverage provided by the health insurers is shown in Figure 2 by the pertinent Article. No statistically significant differences existed between genders in terms of total costs, dental technician's costs, number of dental appointments, and duration of therapy. However, a trend towards higher costs and longer treatment was observed for women. There were no significant differences between the age groups. Under Article 17d2, only one patient with an ankylosis appears; for this patient, therapy duration was above average.

The greater the diagnostic and therapeutic effort, the larger the number of appointments was and the higher the costs (factor 10–25). The number of appointments and costs relative to treatment steps a through d are summarized in Table VI. A combination of all key symptoms led to the highest overall costs and the longest treatment duration, while expenses were comparatively low for isolated TMJ noises. In terms of the MAP categories, activated TMJ arthrosis resulted in the highest costs (1,281 CHF,  $p < 0.01$ ), and arthralgias incurred the lowest costs. Table VII presents an overview of the cost analysis in terms of the MAP categories.

**Tab. IV** MAP categories with frequency distribution

MAP combinations	37.6%
Myofascial pain	16.5%
Anterior disc displacement with repositioning	14.9%
Other diagnoses (fracture, tumor, etc.)	10.3%
Myofascial pain with limited mouth opening	5.8%
Anterior disc displacement without repositioning, with limited mouth opening	5.8%
TMJ arthrosis (activated)	4.5%
Arthralgia	2.1%
Anterior disc displacement without repositioning, without limited mouth opening	1.7%
TMJ arthrosis (not activated)	0.8%

## Discussion

In this study, key figures for the cost of dental treatment of MAP patients were obtained. Indirect costs (external physiotherapy, loss of earnings, travel expenses, further medical treat-

ment by specialists) were not included. Annually, almost 9% of all patients examined exhibited the key symptoms of TMJ and masticatory muscle pain, noises in the TMJ area during mandibular movements and/or movement limitations of the mandible. Compared to the prevalence data of other authors, which

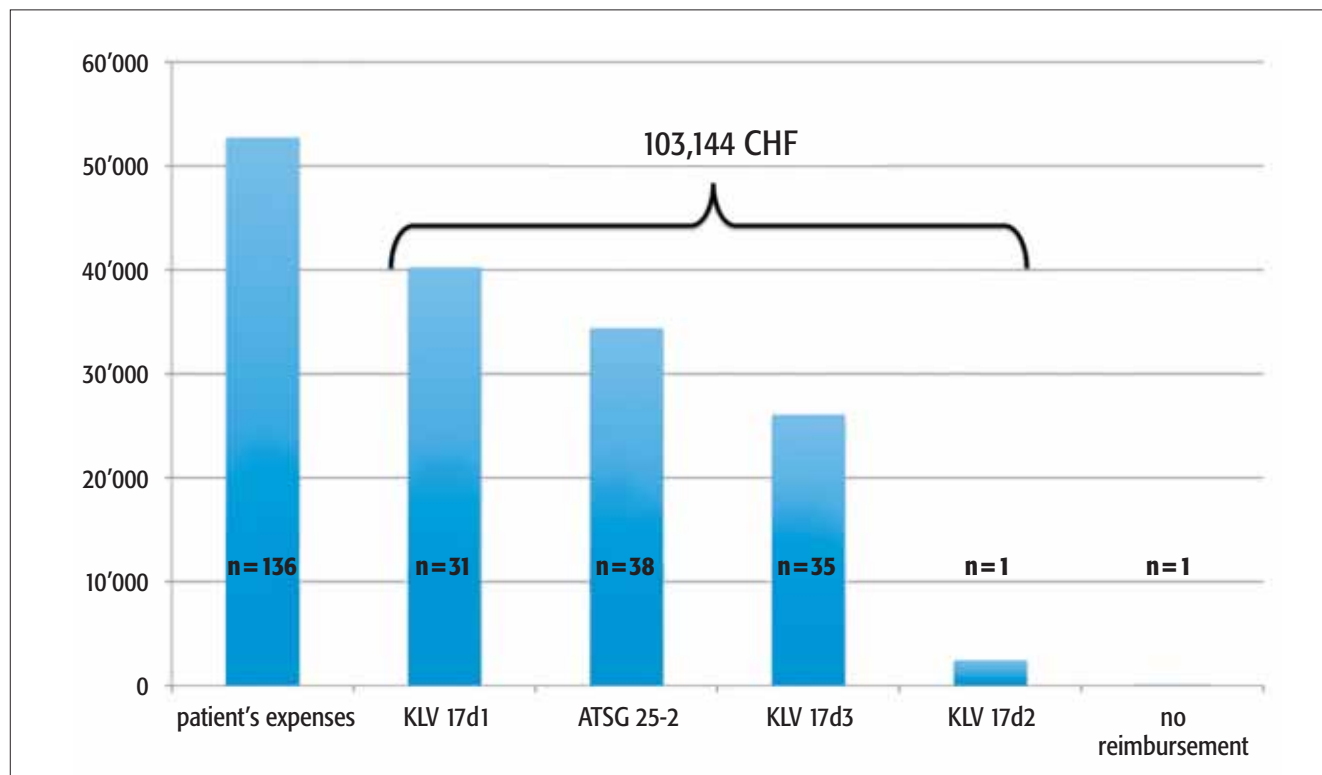


Fig. 2 Sum of costs (242 patients) according to KLV Articles. Costs of obligatory coverage paid by the health insurance agencies amounted to 103,144 CHF during the 4-year observation period.

Tab.V Average treatment costs, number of appointments, and therapy duration per patient, according to Art. 17d1-3 KLV and 25 KVG (105 insured patients).

KLV	Patients		Cost (CHF)			Number of dental appointments	Therapy duration (weeks)
	(N)	(%)	Total	Dentist	Dental laboratory		
17d2	1	0.9	2,445	1,113	1,332	12	80
17d1	31	29.5	1,298	788	510	6	37
25 KVG	38	36.2	905	556	349	6	28
17d3	35	33.3	745	522	223	5	31
<b>Total</b>	<b>105</b>	<b>100</b>	<b>982</b>	<b>618</b>	<b>364</b>	<b>5.7</b>	<b>32</b>

Tab.VI Average treatment costs, number of appointments, and therapy duration per patient, by treatment step (all 242 patients)

Treatment step	(%)	Costs of all patients*	Costs by gender		Costs by age group (years)		
			Women*	Men*	<18*	19-45*	>45*
a	36.0	348	361	309	294	325	409
b	23.5	440	434	456	449	424	461
c	32.6	1,094	1,141	893	1,082	1,060	1,159
d	7.9	745	856	435	1,238	202	1,046

\* Kruskal-Wallis, p<0.05



Tab.VII Average treatment costs, number of appointments, and therapy duration per patient, by MAP diagnosis (all 242 patients)

MAP diagnosis	Patients		Costs (CHF)		Number of dental appointments*	Therapy duration (weeks)*
	(N)	(%)	Total*	Technician		
Activated arthrosis	11	4.5	1,281	679	5.6	35
Combination (tendomyopathy, disc displacement, arthrosis)	91	37.6	832	343	4.9	28
Myofascial pain with limited mouth opening	14	5.8	657	351	5.7	34
Disc displacement without repositioning with limited mouth opening	14	5.8	562	318	2.8	17
other	25	10.3	534	503	3.4	19
Non-activated arthrosis	2	0.8	507	-	1.0	0.2
Myofascial pain	40	16.5	427	209	2.7	11
Disc displacement with repositioning	36	14.9	413	159	2.4	12
Disc displacement without repositioning without limited mouth opening	4	1.7	317	6	2.8	9
Arthralgia	5	2.1	287	-	1.8	3
<b>Total</b>	<b>242</b>	<b>100</b>	<b>644</b>	<b>309</b>	<b>3.8</b>	<b>20.8</b>

\* Kruskal-Wallis, p<0.05

ranged from 2% to 30% (LERESCHÉ 1997, SCHINDLER ET AL. 2007), the percentage found here was low. The anamnestic and diagnostic inclusion criteria, as well as the different referral behavior of dentists in private practice, may explain this. Moreover, many of the prevalence studies were conducted as telephone interviews and are difficult to compare with one another.

The gender distribution clearly demonstrates that most of the patients were female. Gender-specific differences in MAP have been variously examined. Apparently, hormones play a larger role than generally thought (CRAFT 2007). It has been reported that female hormones such as estrogen help relieve masticatory muscle pain in the short term, but increase pain in the long run. In contrast, the present data show no significant difference between the sexes in terms of pain.

Over 50% of the patients were in the age category between 18 and 45 years, and about 35% were older than 45. The age distribution indicates that MAP tends to affect younger people in the authors' region, an observation supported by other studies as well (LERESCHÉ 1997, VON KORFF ET AL. 1993).

95% of the patients were referred to our Clinic for Prosthodontics by dentists in private practice. On the one hand, this could indicate that the cases were generally complex, but on the other hand, it may reflect a reluctance on the part of private practice dentists to treat MAP patients or some uncertainty about the diagnostics and therapy of such patients. Prior to referral to our clinic, 54% of the patients had not received any MAP-oriented treatment. It would have been difficult to document which treatments the patients had undergone previously and to what extent they had simply been "passed along", but this was not the purpose of the present study. Nevertheless, previous therapy attempts may have had a great influence on the findings reported here. The time required both per appointment and for the entire duration of therapy of MAP patients was often considerable.

Nearly 90% of the patients examined complained of various degrees of pain. It is important to obtain an exact differential diagnosis of the pain manifested (GATCHEL ET AL. 2006), because any treatment must be precisely targeted. Otherwise, irreversible, inappropriate dental treatment may result, for instance,

if neuropathic pain in the maxillofacial area is falsely diagnosed as a toothache (TRUELOVE 2004). If the patient reports corresponding symptoms and if clinical signs of a localized endo- or periodontal pathology exist, it may be indicated to objectively validate the working diagnosis by taking an intra-oral radiograph and an OPT. However, routine OPTs for MAP diagnostics are not evidence-based (BROOKS ET AL. 1997).

The most frequent diagnosis was myofascial pain, both with and without limited mouth opening; this agreed with the results of other studies (SCHIFFMAN ET AL. 2007). A diagnosis of anterior disc displacement with repositioning was almost as frequent. This corresponded very well to the symptoms and patients' complaints. Today, bruxism and attrition are relatively common findings, but were not over-represented in this pool of MAP patients. Parafunctions are considered MAP-associated factors (NELSON & LANDAU 1999, HUANG ET AL. 2002). It was difficult to assign some patients to one of the three main axis-I MAP categories (1. tendomyopathy, 2. joint disorders, 3. arthralgia/arthrosis), because 37.6% exhibited a combination of MAP symptoms. This reflects the fact that myoarthropathies of the masticatory system have a multifactorial origin (OKESON 1996) and are also influenced by important factors such as psychological status, social situation, and/or individual perception of pain, pain processing, and pain coping skills. The diagnostic criteria of axis I and axis II took these factors into account (TRUELOVE ET AL. 1992). Seven patients were assessed as being at risk of chronic pain and psychosomatic problems, and were referred to pain management counseling at the Inselspital Hospital. Referral to external pain management counseling seemed unnecessary, too time-consuming (3 to 4 h), or even threatening to many patients, and was thus usually rejected. As part of the examination by the dentist, a short conversation with a psychologist would be desirable and would improve patient care. Such simplified access would also increase the number of patients receiving psychological support (ETTLIN ET AL. 2007).

A further goal of this study was to examine the purely dental costs in the context of the KLV (Health Care Benefits Ordinance). Currently, no Swiss study exists which has analyzed the direct costs of MAP therapy. The projections by the Swiss

Federal Bureau of Statistics can be used for comparison: the average costs per person for dental prophylaxis and treatment in Switzerland were 400 CHF in 2006 (LUZERNER BEITRÄGE ZUR RECHTSWISSENSCHAFT 2008). Thus, the average costs of 348 CHF for information, counseling, and instructions for self-training (step a) incurred per MAP patient were somewhat lower than those for general dental prevention. The overall average dental treatment cost per patient was 644 CHF. The therapeutic principles at the Department of Prosthodontics call for a graduated implementation of therapeutic means, which is also reflected in the differential cost structure. High costs that were markedly above average were incurred by patients for whom a Michigan splint was indicated. In a recent decision, the Federal Court confirmed the ruling according to which treatment with a Michigan splint by the dentist is a medical service, and thus the actual treatment costs (examination, diagnostics, fitting, follow-ups) must be covered the by federal health insurance (Article 25 paragraph 2 letter a KVG). However, the dental and dental-laboratory costs of the Michigan splint itself – as an object not listed in the Products and Equipment list (MiGel) as defined in Article 25 paragraph 2 letter b KVG – would not qualify for coverage (SSO internal report No. 3/2010). The ruling from January, 2011 specified explicitly that the tariff headings 4177 (Michigan splint including impression taking, insertion and instruction), 4075 (centric record), and 4090 (impression

taking) as well as the dental technician’s costs (CHF 590) were not obligatory-coverage services. The Federal Health Office had signalled its general willingness to review the case for accepting a “dental TMJ orthosis” into the Products and Equipment list (MiGel). Similar efforts on the part of the SSO were also being made. In spite of these endeavors, the Department of the Interior recently decided not to include occlusal splints for MAP treatment in the MiGel list.

A model calculation based on the tariff point value (TPV) of 3.10 CHF would yield dental costs of ca. 800 CHF to be covered by the insurer and ca. 980 CHF to be borne by the patient (including the dental technician’s costs of 590 CHF [Tab. VIII]). The total expense of treating a MAP patient – including splint therapy and technician’s costs – would thus amount to 1,780 CHF. Based on a TPV estimate of 3.70 CHF for private patients and taking the price increases into account since the dentist tariffs were introduced in 1994, today the costs would be about 230 CHF higher. The current adjusted, calculated costs are comparable to those in the USA (STOWELL ET AL. 2007). In North America, diagnosis costs \$ 471 on average, and treatment with short intervention was \$ 768. The study by BROTMAN (1997) showed that total costs for one MAP case can reach \$ 12,000 to \$ 20,000 and more. Such therapy concepts include both pain treatment and definitive restorations to improve occlusion and occlusal height to alleviate MAP problems. Neither research nor

Tab.VIII Model cost calculation for MAP treatment with examination, diagnostics, therapy planning and additional splint treatment, divided into amount borne by the insurer and that borne by the patient, based on the tariff point value (TPV) of 3.10 CHF and an estimated TPV of 3.70 CHF for private patients, taking the price increases into account since the dentist tariffs were introduced in 1994.

Work	Position	Number	TP	Amount (TPV 3.10)	Amount (TPV 3.70)
<b>a) Obligatory coverage according to KVG</b>					
<b>MAP findings and, if applicable, Michigan splint follow-ups:</b>					
MAP anamnesis and counseling the MAP patient (per 5 min.)	4160	6	9	167.40	199.80
Functional diagnosis, without color marking	4162	1	13	40.30	48.10
Muscle diagnosis	4165	1	16	49.60	59.20
Determining and color marking premature contacts RCP/ICP or gliding interferences	4167	1	13	40.30	48.10
(If present:) Seek grinding facets and determine bruxing facet adjustment or record orofacial parafunctions, with color marking	4168	1	9.5	29.45	35.15
Palpation and auscultation of the TMJ	4169	1	5	15.50	18.50
Interim report, supplementary report, or final report	4044	1	24	74.40	88.80
Instructions on heat and cold therapy, massage	4185	1	14	43.40	51.80
Recording findings for MAP recall patients, most recent examination less than 12 months ago (per 5 min.)	4161	6	9	167.40	199.80
Adjusting a splint (per 5 min.)	4191	6	9	167.40	199.80
<b>Subtotal a)</b>			<b>TP 256.50</b>	<b>795.15</b>	<b>949.05</b>
<b>b) Coverage not obligatory</b>					
<b>Michigan splint:</b>					
Michigan splint	4177	1	87	269.70	321.90
Facebow rapid transfer methods with mean setting	4080	1	17	52.70	62.90
Centric record with wax plate or paste, per record	4075	1	11	34.10	40.70
Impression taking of the jaw (dentist)	4090	1	12	37.20	44.40
Dental laboratory (ca.)					590.00
<b>Subtotal b)</b>			<b>TP 127.0</b>	<b>983.70</b>	<b>1,059.90</b>
<b>Total</b>			<b>TP 371.50</b>	<b>1,778.85</b>	<b>2,008.95</b>

clinical experience support this type of irreversible treatment, because the stomatognathic system exhibits functional and morphological variability (TÜRPE ET AL. 2008). With the simple, conservative treatment approaches employed here, the long-term prognosis is favorable. Of course, it was possible that the patients also needed dental and/or prosthodontic treatment for other reasons (caries, endodontic problems). However, these were not considered "causal" or necessary measures in the context of MAP therapy. Importance was placed on consulting, informing, instructing and supporting the patients.

Figure 2 also shows that to date, the total costs have been balanced between patient and insurer. Socioeconomically, not only the cost per case is important, but also the number of patients with the given obligatory-coverage disease. Not all treatment steps are necessary in every MAP case; thus, final costs may be lower.

In the present study, the number of appointments were recorded instead of the time required. Treatment was judged to be completed when the patient no longer exhibited symptoms or did not request further follow-ups. The average calculated costs demonstrated that only about 30 minutes per appointment should have been allowed. Thus, the treatment of MAP patients is not particularly well-paid, as experience has shown that the time required for consultation, diagnosis, information, advice, administration and correspondence greatly exceeds 30 minutes and consequently is not covered comprehensively. The situation could be improved by appreciating the anamnestic and therapeutic consultation in addition to the administrative services which must be provided in treating MAP patients.

## Conclusions

Diagnostics and therapy of MAP patients are founded on a thorough anamnestic consultation and detailed diagnosis. Consequently, simple, reversible and conservative treatment largely leads to success. In the present study, the purely dentist-related costs calculated here of an average of 644 CHF for the treatment of MAP patients are comparatively low. The total expenses for MAP cases would be higher if external costs for physiotherapy, physician's services, or loss of earnings were also included.

A model calculation for MAP treatment with a splint (findings, diagnostics, planning and splint) would yield total dental costs of 1,778 CHF (795 to be covered by the insurer/983 to be borne by the patient, including the dental technician's costs of 590 CHF) based on the TPV of 3.10 CHF from 1994. Based on a TPV estimate of 3.70 CHF for private patients and taking

the price increases into account, today the costs would be about 230 CHF higher.

The more time-consuming services, such as providing information, counseling and instructions, are poorly remunerated. This aspect should be re-evaluated in a future revision of the tariff schedule.

## Résumé

Cette étude a pour but de documenter et d'évaluer les coûts de traitement des patients pris en charge pour une myoarthropathie du système masticatoire (MAP) à la Clinique de prothèse dentaire de l'Université de Berne.

Cette étude rétrospective inclut 242 patients MAP traités à la Clinique de prothèse dentaire entre 2003 et 2006. Les paramètres suivants ont été évalués à partir des données des dossiers cliniques: plainte principale, diagnostic, thérapie, coûts totaux, coûts de laboratoire, nombre de séances, coût moyen par séance, durée du traitement et article(s) de la LAMaL (art. 25 de la LAMaL ou art. 17d1-3 de l'OPAS) correspondant au diagnostic.

L'âge moyen des patients était de 41,1+/-17,2 ans (76,4% de femmes, 23,6% d'hommes). La douleur, dans 91,3% des cas, des bruits articulaires (61,2%) ou une limitation de la mobilité mandibulaire (53,3%) constituaient la plainte principale. Les diagnostics de tendomyopathie (22,3%), de luxation méniscale (22,4%) ou une combinaison des deux ont été posés beaucoup plus fréquemment que celui d'arthropathie seule (7,4%). D'autre part, 10,3% des patients MAP avait un autre diagnostic principal (tumeur, traumatisme, etc.). Les traitements suivants, ont été effectués: conseils et exercices musculaires (36,0%), physiothérapie (23,6%) ou gouttières occlusales (32,6%). Le traitement a coûté CHF 644.- par cas pour quatre séances sur une durée de 21 semaines en moyenne.

Dans la majorité des cas, les patients peuvent être traités avec des thérapies conservatrices peu onéreuses. Dans 99,9% des cas annoncés à l'assurance, le traitement a été pris en charge selon le chiffre 17d1-3 de l'OPAS ou 25 de la LAMaL. Les coûts du traitement effectué par le médecin-dentiste restent modestes. Les prestations requérant plus de temps comme l'information, les conseils et instructions sont peu rétribuées dans le tarif. Cet aspect devrait être revu dans une prochaine révision du tarif.

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