Classification Issues Related to Neuropathic Trigeminal Pain

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The goal of a classification system of medical conditions is to facilitate accurate communication, to ensure that each condition is described uniformly and universally and that all data banks for the storage and retrieval of research and clinical data related to the conditions are consistent. Classification entails deciding which kinds of diagnostic entities should be recognized and how to order them in a meaningful way. Currently there are 3 major pain classification systems of relevance to orofacial pain: The International Association for the Study of Pain classification system, the International Headache Society classification system, and the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD). All use different methodologies, and only the RDC/TMD take into account social and psychologic factors in the classification of conditions. Classification systems need to be reliable, valid, comprehensive, generalizable, and flexible, and they need to be tested using consensus views of experts as well as the available literature. There is an urgent need for a robust classification system for neuropathic trigeminal pain. J OROFAC PAIN 2004; 18:325–331

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Research into neuropathic trigeminal pain will only advance if there is an internationally agreed-upon, valid, and reliable classification system. This report aims to address the strengths and weaknesses of existing systems and to provide pointers for future development of improved neuropathic trigeminal pain classification. It is based on a review of literature identified through Medline using the search terms *classification systems, pain,* and *neuropathic pain* and of the author's own collection of studies.

Goals and Importance of Classification Systems

The goal of a classification system of medical conditions is to facilitate accurate communication, to ensure that each condition is described uniformly and universally and that all data banks for the storage and retrieval of research and clinical data related to the conditions are consistent. Classification entails deciding which kinds of diagnostic entities should be recognized and how to order them in a meaningful way.

Table 1 Existing Classification Systems of Relevance to Trigeminal Pain

	IASP	IHS	RDC/TMD
Country	International	International	UN
Year	1994	2004	1992
Area of expertise	More than 100 pain specialists in all areas of pain	More than 100 neurologists, psychiatrists, and dentists	Dentists, epidemiologists
Purpose/audience	For all members of IASP	Headache community for scientific studies	Research
Domain	Whole body	Head, face	TMD
Categories	All pain, neuralgias of the head and face	Part 1 primary headaches, Part 2 secondary headaches, and Part 3 cranial neuralgias, central and primary facial pain, and other headaches	
Clear criteria	Description of the disease	Yes	Yes
No. of axes	5 biomedical axes	1	2 axes—biomedical and disability (including psychological status)

IASP = International Association for the Study of Pain[3]; IHS = International Headache Society[4]; RDC/TMD = Research Diagnostic Criteria for Temporomandibular Disorders.[5]

Classification systems are important because they impinge on all aspects of medicine in providing a framework for the comparison of observations. Research becomes possible in the knowledge that the same entity is being studied. Classification systems are the cornerstone of research in epidemiologic studies, including studies of risk factors and prognosis; prescription of treatments; evaluation of treatment efficacy; decision making; and planning.

In the field of pain it is important to have a system that would identify all chronic pain syndromes and would provide a good description of each. The success of a classification system can be judged by the number of articles that use it as a point of reference and by the number of articles suggesting revisions and improvements. For example, using the older version of the International Headache Society (IHS) classification, Pfaffenrath et al[1] showed that the classification of atypical facial pain was still imprecise. The IHS has claimed that its classification of headache and facial pain has not only affected research but has changed clinical practice, eg, that clinicians have altered their history taking, omitting certain questions and including others in order to be more accurate in their diagnosis. The evaluation of triptans in headaches has been made possible because of the clear IHS criteria, which ensured the correct patients were entered in the trials.

Existing Validated Pain Classification Systems

There are a vast number of classifications in existence and the most well known and embracing of all is the World Health Organization (WHO) International Classification of Diseases (ICD-10), which is now in its 10th edition.[2] Table 1 lists features of the 3 most widely used classification systems in the area of pain. The most internationally used system is that of the International Association for the Study of Pain (IASP).[3] Classifications more specific to orofacial pain are the IHS system[4] and the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD).[5] The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR),[6] which is published by the American Psychiatric Association, may also be of relevance to trigeminal pain. In the IASP system, all pains of the head and neck are grouped under neuralgias of the head and face. It is a multiaxial system that uses 5 axes to classify pain:

- Axis I: Region. If the pain is in more than 1 region, 2 codes are assigned.
- Axis II: System (eg, nervous, respiratory)
- Axis III: Temporal characteristics (eg, continuous, paroxysmal)
- Axis IV: Patient's statement of intensity in relation to time of onset, eg, severe and lasting for 1 to 6 months
- Axis V: Etiology (eg, congenital, traumatic, psychological). This remains controversial and may need to change.

On the other hand, the IHS classification is unidimensional; codes are mainly based on etiology. Thus trigeminal neuralgia is coded as 13.1, but may be further subdivided into classical trigeminal neuralgia (13.1.1) or symptomatic trigeminal neuralgia

(13.1.2). It is possible for a patient to receive more than 1 diagnosis (eg, trigeminal neuralgia and migraine). The IHS provides clear criteria for each condition, including details on which criteria and how many criteria need to be present to make a particular diagnosis. An updated 2004 version is available on the IHS website. In the new version, facial pain falls under 2 main sections. One is section 11, headaches or facial pain attributable to various facial structures. TMD can be found in this section; however, the criteria given are much less precise than RDC/ TMD criteria. The other section is section 13, central neuralgias and central causes of facial pain, which includes trigeminal neuralgia but also atypical facial pain (called persistent idiopathic facial pain in this system) and burning mouth syndrome.

The RDC/TMD provide a standardized system for examining and classifying the most common subtypes of TMD on 2 axes, physiologic and psychologic, and relate to only these conditions.

Variables Used in Classification Systems

Theory of Classification

Classification systems can be devised by a single author, but most are based on a consensus of experts. A vast number of classification systems are available in every area of medicine. Turk and Rudy[7–9] suggest that there are 2 major strategies for classifications: the theoretical model and the empirical model.

The theoretical model's approach is a deductive process that attempts to define a preconceived cluster of characteristics which is thought to be able to discriminate between different diseases. Under this system, it would be possible for the same group of symptoms and signs to be present in different parts of the body and have the same name, provided location is not taken into account. The WHO ICD-10, IASP, and IHS classification systems use this approach. Thus the diagnostic criteria of postherpetic neuralgia are as applicable to the trigeminal system as they are to the abdomen, if location is not considered.

The empirical approach is inductive and sets out to first identify a naturally occurring set of variables that characterizes each group and then, by means of cluster statistics, attempts to determine categories. Examples of this classification model are the Minnesota Multiphasic Personality Inventory and the Symptom Checklist-90 Revised systems used in psychological assessments.

Woda and Pionchon's classification of orofacial pain[10] is based on this model. Woda and Pionchon have postulated that many of the orofacial diseases are in fact the same, but because they arise from different tissues (eg, bone, muscles, tooth, oral mucosa, joints), they are expressed differently. They used the empirical method of classification and carried out a cluster analysis on the basis of a prospective, multicenter series of 245 consecutive patients presenting with a chronic facial pain whose signs and symptoms were documented through the use of structured questionnaires.

They identified 3 groups:

1. Migraines and tension headaches
2. Cluster headache, posttraumatic pain, and idiopathic trigeminal neuralgia
3. Stomatodynia, and a group comprising atypical odontalgia, atypical facial pain, and TMJ and masticatory muscle disorders which could only be differentiated by location.[11]

Criteria Used

The criteria for each disorder to be included in a classification can be objective or subjective and can be derived from descriptive studies, cohort studies, epidemiological studies, treatment results, genetics, imaging, or pathophysiology. These constellations are then given a semantic label. The labels used have different derivations. Some are derived from symptoms and signs, such as burning mouth syndrome, whereas others derive from a pathophysiologic hypothesis, eg, trigeminal neuralgia.[12,13] A label may also vary depending on the setting in which it is used, level of current knowledge, who is making the diagnosis (eg, a neurologist or a dentist), what it is being used for, and even the level of certainty of the criteria itself (eg, atypical facial pain, chronic persistent idiopathic facial pain).

Order of Diagnostic Criteria

The order in which these diagnostic criteria are considered can vary significantly. Several methods are used in the field of pain—etiologic, system of the body, system pattern and type of symptom (eg, psychiatric), time of occurrence (eg, congenital), mechanism based, epidemiologic, practice based, and biopsychosocial. A multiaxial system uses several of these. Within each major group there will be further subdivisions, which can result in overlap. Operational considerations also need to be taken into account and may result in the system

not being suitable for all purposes. For example, postherpetic neuralgia can be classified on the basis of etiology, pathogenesis, mechanism, or clinical presentation.[12,13] The IASP classification has taken the practical view and uses mainly syndromes, eg, neuralgias of the head and neck, as the basis for its system.

An etiologically based system (eg, ICD-10) divides pain causation as far as can be identified and is the commonest one used. A large part of the IHS classification uses this method—part 2, the secondary headaches, in which all are attributed to a known cause.

More recently Woolf et al[14] have suggested that the usual physical diagnosis should be replaced by a mechanism-based classification. Thus neuropathic pain, whatever its location or cause, is the same, and so can potentially be treated in the same way. Hansson,[15] however, has argued that our inability to translate clinical symptoms and signs into pathophysiologic mechanisms means that this mechanism-based classification of pain is still not feasible. An example of the use of this approach could be seen in a trial of lamotrigine in the treatment of neuropathic pain in which no attempt was made to differentiate between different conditions such as trigeminal neuralgia and diabetic neuropathy.[16]

Hapak et al[17] have devised an epidemiologically oriented classification of facial pain. They devised a patient-completed questionnaire, which included a diagram of chief pain location and a digital pain scale for severity, that enabled them to put 21 patients into 1 of 3 broad diagnostic groups, musculoligamentous, dentoalveolar, or neurological. Such a division, they suggested, would categorize patients sufficiently for them to be referred to the correct secondary-care specialist, who would then carry out a full assessment, make the final diagnosis, and classify them more fully.

On the other hand, Burchiel[18] has put forward what he terms a patient-orientated classification in regard to neurosurgical practice. He analyzed the types of patients who attended his clinical practice and put forward a group of 7 orofacial conditions that need to be considered. This system includes the following categories: 2 types of trigeminal neuralgia, neuropathic trigeminal pain due to unintentional, incidental trauma; a trigeminal deafferentation pain due to intentional damage caused by procedures often done for treatment of trigeminal neuralgia; and symptomatic trigeminal neuralgia due to multiple sclerosis. It does not include other neuropathic pains, such as postherpetic neuralgia.

Biopsychosocial Classification

Most of the diagnostic criteria already described are based on the biomedical model in which the disease and not the patient is classified. The disease has fixed characteristics independent of the patient. A biopsychosocial approach to classification would expand a single item diagnosis to several axes and would therefore enable the inclusion of biologic, social, and psychologic factors to be related to the diagnosis. This method would explain why, for instance, different results may be obtained in patients who according to the biomedical model have exactly the same disease. Turk and Rudy[19] have argued that this type of approach is crucial if a classification system is to lead to improved treatment outcomes. Turk[8] proposed that this multiaxial approach be based on 3 questions:

1. What is the extent of the patient's physical pathology?
2. What is the magnitude of the patient's disability (suffering and inability to enjoy his or her usual activities)?
3. Is the patient's behavior consistent with the pathology identified, or is there evidence of amplification of symptoms for any of a variety of psychological, social, or economic purposes?

In psychiatry, the DSM-IV-TR system[6] has a multiaxial system that may be of relevance to trigeminal pain, as it could be used in conjunction with the IHS or IASP classification. It classifies patients on 5 axes:

- Axis I: Clinical disorder—clinical syndromes
- Axis II: Disability—how well the patient has adapted to the condition in which the patient now finds him- or herself
- Axis III: Contextual (biological) factors—any current physical disorder or condition that is potentially relevant to understanding or management of the clinical disorder. This includes biological stressors that could affect adaptation.
- Axis IV: Quality of life (psyche)—the psychosocial and environmental problems that may affect diagnosis, treatment, and prognosis of the main condition given in Axis I.
- Axis V: Global assessment of functioning— quantification of the effectiveness of adaptation at a relevant point in time.

Oken[20] has proposed that use of this system makes it possible to make the following statement:

"1. a person who had been functioning more or less 'normally' at a quantifiable stable level of overall adeptness (Axis V, first time point)

2. perhaps made vulnerable by certain pre-existing chronic conditions (from Axis II)

3. has become acutely maladapted in a certain way (from Axis I)

4. because of exposure to certain stressors, both biological (Axis III) and psychosocial (from Axis IV) and

5. now functioning at a new quantified impaired level of overall adaptation (Axis V, second time point)."

Although this system appears to be complex, this is more representative of the typical chronic orofacial pain patient, who will not have just 1 disorder but several disorders that interact and cause a variety of biological or psychological changes. A patient adapts to his or her changing status in a way that incorporates biological, psychological, and social variables.

This principle is used in the RDC/TMD, which identify 3 physiologic groups on Axis I but also include a psychological assessment and assess the degree to which the pain interferes in everyday life. This type of classification system can then be used to deliver treatment that is individualized.[21]

Turk and Rudy[19] took patients with low back pain, TMD, and head pain and, using the Multidimensional Personality Inventory (MPI), classified them also as being dysfunctional, interpersonally distressed, or adaptive copers. They showed that patients' responses to their pain are likely to be similar even if the pain is based on different medical causes.

Requirements for a Classification System in Neuropathic Trigeminal Pain

The ideal classification should be completely exhaustive, and each category should be mutually exclusive. This, however, will never be possible in medicine, so compromises are made. The crucial question that must be asked when assessing any classification system is "Does the assignment of an individual patient to a group facilitate treatment decisions or predict future outcomes and behavior?" *A good classification system needs to be reliable, valid, comprehensive, and generalizable.*

In order to be reliable, the classification system must ensure that every observer and even the same observer on another occasion always puts the dis-

ease into the same category. This is relatively easy to do and has been tested for the IASP, IHS, and RDC/TMD systems. Validity is harder to prove, as it aims to separate patients into distinct types which may then be amenable to the same treatments. The IHS system claims that the similarity of results in all the international collaborative centers on the use of triptans suggests that the criteria were correct. The validity and reliability of the RDC/TMD was tested using an international TMD research consortium involving 13 clinics, which collected 4,000 cases a year.[22] However, Emshoff and Rudisch,[23] using magnetic resonance imaging of the temporomandibular joint as the gold standard, failed to show good reliability with the RDC/TMD criteria for internal derangement and osteoarthrosis.

The classification needs to be comprehensive and allow for all conditions to be included. How is a condition classified if the criteria do not satisfy all the inclusion criteria? For example, patients with trigeminal neuralgia who also say they have a dull background aching burning pain do not fit precisely into the IHS criteria for classical trigeminal neuralgia. The IHS classification does not include trigeminal nerve damage pain, whereas in the IASP system, such patients would need to be classified as having secondary trigeminal neuralgia.

On the other hand, a classification system can be so comprehensive that nearly all conditions fit, eg, persistent idiopathic facial pain. A classification system may work well in 1 setting but may cease being effective when transferred to another setting. For example, Burchiel's proposed system,[18] which may be of value in a neurosurgical setting, will not be generalizable to a facial pain clinic where there is a different range of patients. A classification should be multidimensional and classify pain not only on several biomedical levels but also on several biopsychosocial levels: body region, system involved, etiology, temporal characteristics, intensity, duration of symptoms, provoking and relieving factors, psychological, and social.

Some guidance on how to apply the classification system is often needed. Some systems require special training, others are done by questionnaire or interview, and yet others may require tests. If they are too complex or take too much time, they will not be used for routine clinical practice. It has therefore been suggested that certain classification systems should only be used for research purposes and that others should exist for clinical practice. The RDC/TMD system is an example of a classification system used only in research. The IHS also considered this option but decided it was too complex.

Instead it has made a hierarchical classification that enables practitioners to classify patients into broad categories; the specialist will further subdivide these categories within each section.

Currently there does not appear to be a robust system for classifying all neuropathic trigeminal pain that would be acceptable to a wide range of users. This is urgently needed because of the wide range of terminologies for the different facial pain conditions and the varying criteria that are used. There is reasonable agreement on what is meant by the phrase "trigeminal neuralgia," but other conditions are far from clear. It could be argued that more encompassing names are needed for atypical odontalgia, atypical facial pain, and TMD. Other conditions, such as trigeminal nerve damage (surgical or chemical), need to be more fully explored and broken down into subgroups, eg, due to type of trauma sustained.

Classification systems therefore need to be regularly reviewed and amended as new knowledge is gained. This is especially important in trigeminal pain, as there are very few objective means of validating the patients' history, and no "gold standard" tests exist.

Methods to Reach Agreement

Validity and reliability testing of a classification system is an arduous process and requires a systematic review of the literature and then a consensus of experts. Some of these issues could be tackled using methods such as the Delphi technique or the nominal group technique.

Delphi Technique

This technique is based on a structured process for collecting and distilling knowledge from a group of experts by means of a series of questionnaires interspersed with controlled opinion feedback.[24] It provides a method of achieving consensus that is low in cost and has no constraints on group size, and reliability increases with larger numbers. It is primarily concerned with making the best of a less-than-perfect amount of information. It draws in a systematic manner on information from a group of experts. Experts often find it to be a novel and interesting way of exchanging and distilling information, so it can be a highly motivating task.

Geographic dispersion and heterogeneity of participants are possible, anonymity is preserved, and it cannot be dominated by 1 particular group or person. It minimizes the tendency to follow the leader

and shows clearly how informed judgment was achieved. This method has been used, for example, to determine the best clinical criteria for carpal tunnel syndrome.[25]

Nominal Group Technique

This method relies on a meeting of experts. Once the topic has been clearly identified, the participants individually generate ideas in writing. The facilitator then leads a roundtable discussion of the main ideas. Each recorded idea is next discussed for clarification and evaluation. Individual voting then takes place on the ranking of the ideas. Further discussions then take place about the achieved order, and a final vote is taken. This methodology has been used, for example, to come to a consensus view on the terminology of myelofibrosis with myeloid metaplasia.[26]

Prospective Classification System for Neuropathic Trigeminal Pain

There is no doubt that further work is necessary to develop a good classification system for neuropathic trigeminal pain and that it will need continual upgrading as the knowledge base expands.

Woda et al's work[11] could be extended to a wider audience as has been done for TMD. Other specialties have faced the same problems, and this has led to the development of the CARE project[27] (www.carestudy.com). It is run by the evidence-based team at Oxford and could provide a way for clinicians from around the world to contribute data on clinical features of a range of orofacial pains and then for the analysis to be done collectively. Once the diagnostic criteria have been established, they can be ranked and a diagnostic weighted scale can be developed which can then undergo validity testing. It is essential that the classification is multiaxial. It would then be possible, for example, to establish whether chronic idiopathic facial pain is a heterogenous group that needs to be divided up into neuropathic pain and psychologic pain.

There is a need for a simple, universal classification system for neuropathic trigeminal pain. The system does not need to be perfect, but there should be agreement about the operational definitions. Such agreement will allow clinicians to move away from the debate on classification and toward the debate over how best to manage the conditions. As new information comes to light, the criteria can be altered to reflect it.

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