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Development of Korean Academy of Medical Sciences Guideline-Rating the Impairment in Pain

Pain-related impairment assessment by the fifth edition of the American Medical Association Guides had many ambiguous points, and therefore, it was not applicable directly in Korea. Several disputable pain disorders were excluded from the list of impairment evaluation, and complex regional pain syndrome was chosen as the first object of impairment evaluation. Scales such as Korean version of modified Barthel index for assessing the activity of daily livings and Beck Depression Inventory for assessing depression were added, and pain severity, pain treatment, pain behavior, etc. were scored. In order to objectify as much as possible and to remove the room for misuse, we develop a new rating system based on the concept of total score.

Key Words : *Pain; Disability Evaluation; Complex Regional Pain Syndrome*

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INTRODUCTION

Pain is defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage (1). Pain is a symptom caused by an acute injury or tissue damage, and it generally disappears when the cause is resolved. In some cases, however, it may chronically continue even after the cause has been resolved and becomes the biggest problem in impairment assessment.

There are several contradictory contents in the pain chapter of the fifth edition of the American Medical Association's Guides to the Evaluation of Permanent Impairment (referred to as '*Guides*' hereinafter) (2). In addition, experts in impairment evaluation have conflicting opinions on the contents. Subjectivity, which is the most basic feature of pain, goes against the basis of *Guides*, which are basically based on objective medical data. Furthermore, even if impairment evaluation is made on the basis of objective data, it is very difficult to decide what diagnostic system should be used to diagnose pain and what assessment system should be used to quantify the effect of pain on the loss of body function or the limitation of the activity of daily livings (ADL). The authors could not answer many questions that have been unanswered so far. However, we tried to improve several pain assessment systems under the fifth edition of *Guides* to be more rational, reflecting the current situation of Korea.

MATERIALS AND METHODS

Development of pain-related impairment evaluation was assigned to the Nervous System Team. However, believing that a separate evaluation team is necessary because pain-related impairment evaluation is dealt with in a separate chapter of the fifth edition of *Guides* and is handled in methods different from other types of impairment evaluation in Chapter 3 of the sixth edition *Guides*, (3) a research team was formed with experts experienced in pain and impairment evaluation in the areas of pain, rehabilitation, orthopedic and neuropsychiatric medicine. Pain-related impairment was analyzed basically based on the fifth edition of *Guides*, but we tried to

establish criteria applicable to the current situation of Korea.

RESULTS

Basic principle

Objects of impairment evaluation

In Pain chapter of the fifth edition of *Guides*, following conditions are assessed when there is excess pain in the context of verifiable medical conditions that cause pain, when there are well-established pain syndromes without significant, identifiable organ dysfunction to explain the pain (e.g. headache, postherpetic neuralgia), when there are other associated pain syndromes (e.g. postparaplegic pain, syringomyelia pain).

The associated pain syndromes among these variable conditions are basically assessable according to other chapters in the *Guides* and additional impairment due to pain could be considered when examiner performs a final impairment rating.

If they are not covered in other chapters, well-established pain syndromes like headache and postherpetic neuralgia are not easy to evaluate their severity, and can hardly be regarded as permanent impairment or continuous impairment, therefore, we decided not to acknowledge them. In case of complex regional pain syndrome (CRPS), which is the only case that has objective diagnostic criteria, it is accepted as an object of evaluation if it satisfies the diagnostic criteria (Table 1).

Table 1. Objective criteria of complex regional pain syndrome

Local clinical signs	
Vasomotor change	Skin color: mottled or cyanotic
	Skin temperature: cool
	Edema
Sudomotor change	Skin dry or overly most
Trophic change	
Skin texture	Smooth, non elastic
Soft tissue atrophy	Especially in fingertips
Range of motion	Joint stiffness and decreased passive motion
Nail change	Blemished, curved, talonlike
Hair growth change	Fall out, longer, finer
Radiographic change	
Radiograph	Trophic bone change, osteoporosis
Bone scan	Findings of consistent with CRPS
Interpretation	≥8: Probable CRPS
	<8: No CRPS

In the diagnostic criteria as above, each of the following conditions should be satisfied.
In order to objectify difference in skin temperature, the difference of temperature from the unaffected side in a thermometer test should be over 0.6°C. The decrease of passive ROM should not be from pain or from the patient's resistance out of the patient's fear of relapse of pain, and the decreased range should be over 1/4 of the normal range. Changes in the fingernails should not be from fungal infection. With regard to other indicators, there should be clear description in the medical records.

Timing of impairment evaluation

In pain-related impairment, the maximal medical improvement (MMI) should be observed. That is, the time base of evaluation should be when the pain has sufficiently been treated and the medical condition has become static and well stabilized. Based on medical records showing that pain treatment has continuously been made, impairment evaluation should be made when treatment has been continued for at least a year since the onset and the symptom has been stabilized.

Reservation of rating

Even if it has been over a year since the onset, if the improvement of ADL or pain is still going on, evaluation cannot be made. If further improvement in ADL or pain is expected through adequate procedure, surgical operation or other interventions, impairment evaluation should be made after sufficient treatment.

Re-rating of the impairment

MMI, which is the time of impairment evaluation, means the time when the medical condition has been stabilized, but in case of pain-related impairment, the patient's medical condition is likely to change over time. Accordingly, in case of pain-related condition, impairment should be reevaluated in every two years. However, if the same grade as or a higher one than the first evaluation was given in the two subsequent reevaluations (so in total of three evaluations), the patient can be exempted from obligatory reevaluation and get the permanent impairment.

Pain-related impairment rating system

Rating step

1) Determine that the patient meets the objective diagnostic criteria of CRPS (Table 1). And determine that the patient has reached MMI.

2) Evaluate pain severity based on intensity and frequency. Evaluate pain severity basically using a visual analogue scale (VAS), and refer to the severity of pain at the time of evaluation as well as VAS score and the frequency of pain in existing medical records.

3) Evaluate ADLs and emotional distress using the Modified Barthel Index score and Beck Depression Inventory score, respectively (Appendix 1, 2).

4) Determine the frequency and intensity of treatment based on past medical records.

5) Perform physical examination, determine pain behavior and credibility, and then, sum up the results of 2-4 and calculate the scores in Table 2.

6) If the patient's behavior is markedly inconsistent in terms of each of the evaluation items in Table 2, mark 'unratable' and do not give a mark for the corresponding item.

Table 2. Pain-related impairment scoring system

Pain score	1-5	6-10	11-15	16-20	Total
Pain	Pain severity, based on intensity and frequency, is mild	Pain severity, based on intensity and frequency, is moderate	Pain is present most of the time and may reach an intensity of 9-10/10	Pain is essentially continuous, and should reach an intensity of 9-10/10	
ADLs (Modified Barthel index score)	81-99	51-80	21-50	0-20	
Emotional Distress (Beck depression Inventory score)	10-15	16-23	24-40	41-63	
Treatment	Occasional treatment for pain	Individual requires periodical medical monitoring and ongoing medication	Individual requires medication to control pain on a maintenance basis	Individual requires maximal pharmacologic and interventional medicine on an ongoing basis	
Pain score	1-2	3-5	6-8	9-10	Total
Pain behavior	Few pain behaviors; Pain related behaviors during physical examination are mild and appropriate	Some pain behaviors; significant pain related limitations on physical examination, and they appear uncertainly appropriate	Severe pain behaviors are observed during physical examination that may make the examination difficult to perform and results difficult to interpret	Physical examination is impossible to perform due to intolerance of many physical maneuvers; many pain behaviors are observed, and they appear to be suitable to the organ dysfunction	
Credibility	The examiner should give a score between +10 and -10 to judge the credibility of individual based on 1. appropriate illness behavior, 2. whether symptoms and signs are congruent with established condition and anatomy, 3. whether symptoms and signs are congruent over time and situation				
Total					

Medical record

Because impairment evaluation is made for stable impairment after at least a year's continuous and sincere treatment, the grade of impairment should be given after the applicant's clinical records for over a year before the impairment evaluation has been examined. If the last one year's medical records on quantified pain or treatment history are not available, impairment evaluation is impossible.

Whole person impairment

Pain-related impairment is quantified of 100, and is converted to upper extremity or lower extremity impairment. The accurate conversion value follows the decision of the general committee.

Additional impairment

Combine the other impairment values in each extremity. Impairment values for sensory and motor deficits of a specific nerve structure cannot be applied. Total combined impairment values should not exceed the maximal impairment values for each extremity. If impairment values for depression disorder have been applied, emotional distress part of Table 2 cannot be applied.

DISCUSSION

Subjective and objective findings of pain-related impairment

In the *Guides*, it was from the fifth edition that pain-related impairment evaluation began to be made properly (2). The reason that pain-related impairment evaluation is most controversial is that pain is a subjective symptom. As defined by IASP, pain is an unpleasant sensory and emotional experience and is not an objective finding. Physicians guess a patient's pain indirectly based on the patient's statements like 'I feel a sharp pain,' 'It is too painful to move' and 'I cannot sleep because of pain,' but cannot objectively quantify patients' pain. The basic principle of *Guides* is 'consensus-derived percentage estimate of loss, which reflects severity of impairment for a given health condition, and the degree of associated limitations in terms of ADLs' (2), and the percentage estimate can attain consensus only when it is based on objective data rather than on the patient's statement. Thus, pain-related impairment is quite tricky. Apart from objective data, we can here get one of important methods for pain-related impairment evaluation. It is evaluation through communication with the patient, namely, using a questionnaire. There have been many studies on how to quantify patients' self-

report by digital or analogue methods, and considering the subjective nature of pain itself, such methods are essential for pain evaluation. The objective aspect of pain is observing various reflections of pain. Those who feel a pain in their arm will have atrophy because they do not use the arm sufficiently, and severe pains will increase the number of visits to a pain clinic or a physician who can treat pain. These findings can objectively be quantified, and can be used to assess pain-related impairment.

Objects of impairment evaluation

We exclude various pain disorders except CRPS.

As mentioned in the introduction, pain-related impairment is quite difficult to assess, and there have been only a few relevant researches.

The reason that it is difficult to evaluate pain-related impairment is that objective pain assessment is impossible and the quantification of the severity of pain is very subjective. In impairment evaluation involving monetary interests, there can be social fallacies as patients will try to exaggerate their pain, and insurance companies and government liable for compensation will not admit the severity asserted by the patients. Different from other chapters in the fifth edition of *Guides*, pain impairment evaluation in the pain chapter is not a quantitative evaluation but qualitative evaluation. It classifies pain into five grades to be helpful in case where there are rules on pain-related impairment or in decisions at the court, and the grades are not converted to whole person impairment. However, 3% impairment rate can additionally be acknowledged. Different from that in the fifth edition, the pain chapter in the sixth edition deals with controversies over pain-related impairment evaluation using a large part of the chapter (3). In addition, it states that, in the current situation where there have been few theses on pain-related impairment until now, it is extremely difficult to set criteria or caps for impairment evaluation that can obtain the consensus of all people. As a consequence, the sixth edition of *Guides* decided to acknowledge an additional impairment rate of up to 3% when very strict criteria have been satisfied. There are some concerns in Korea about the possibility of misapplication of the additional rate for pain disorders because the present Korean Guides do not have six-step verification of the fifth edition of Guide to add the 3% impairment. On the contrary, some opinions in Korea maintain that additional impairment of 3% should be acknowledged in case of definite diagnosis of pain disorder. Determination of concrete additional impairment rate in all painful disorders except CRPS is, therefore, reserved until consensus would be formed in the future.

CRPS is dealt with in four chapters of the fifth edition of *Guides*, and many researches have been made on its pathophysiology including neurogenic inflammation and the impairment of the function of the sympathetic nervous system (4-6). Moreover, because the limitation of ADLs caused by CRPS is very serious (7), we decided to take only CRPS as a subject disease.

CRPS

In the fifth edition of *Guides*, impairment evaluation for ordinary pain conditions is covered in the pain part, Chapter 18. However, CRPS is covered separately for reflex sympathetic dystrophy (RSD, CRPS type I) and causalgia (CRPS type II) in the Nervous System part, Chapter 13. It is also mentioned separately in Upper Extremities, Chapter 16 and Lower Extremities, Chapter 17 according to the painful area.

The examiner should perform impairment evaluation only when the clinical pattern meets the diagnostic criteria of CRPS. In the upper extremity part, it is stated that diagnosis is made mainly based on the subjective symptoms due to the characteristics of the CRPS, and there are many conditions should be differential diagnosed. Consequently, diagnostic criteria composed of objective signs and laboratory data are suggested (Table 1).

The method of impairment evaluation is also different according to each part. In the pain part, impairment evaluation is not a quantified concept and it goes through a complicated procedure of 5-6 steps. In the upper extremity part, the loss of motion and sensory deficit and pain caused by CRPS are converted to an upper extremity impairment rate, and then the whole person impairment is calculated. In case of the nervous system part, the whole person impairment rate, ranging from 0% to 60%, is calculated to be one of four grades. In the fifth edition of *Guides* the grades of the upper extremity are determined according to the Table 13-22, whereas those of lower extremity according to the Table 13-15 (2).

Although diagnostic criteria and impairment evaluation procedures are different, it is obvious that CRPS basically is an object of impairment evaluation. Nevertheless, concern and controversy over the impact and consequence of rating CRPS as an impairment have been continued throughout the process of developing the Korean Guides for CRPS patients. The biggest problem is that consensus on diagnostic criteria has not yet been reached.

Diagnostic criteria for CRPS in our guideline borrowed the diagnostic criteria of the upper extremity part in the fifth edition of *Guides* and added the items of object tests on the symptoms in order to reduce the room for controversy. Concerning the criteria, there are opinions such as: 1) CRPS is a disease without consensus among doctors. Thus, impairment evaluation is impossible; 2) No, there is a supplementary measure because reevaluation is made in every two years; 3) When there exist actual patients with disability, aren't the evaluation criteria relatively rational?; and 4) the impairment criteria of the *Guides* are too strict to be applied.

Rating system of pain-related impairment

The main focus was to minimize the aftereffect of pain-related impairment evaluation. As to the time of evaluation, impairment evaluation should be made when the symptom has been stabilized after a year's or longer continuous treatment since the onset (based on medical records showing continuous treatment of pain). In case of pain-related impairment, the patient's medical condition is highly likely to change over time, and therefore, the impairment should be reevaluated in every two years. With regard to rating system, there was an opinion to apply the conventional rating system of the upper extremity part of the fifth edition of *Guides* based on the fact that, even if the conventional rating system of the upper extremity part is borrowed for CRPS rating, consequent impairment rate is not much different from the CRPS rating system of the upper extremity part (8). However, the impairment evaluation of the upper extremities and the lower extremity part use mainly active range of motion, muscle strength and sensory deficit as the evaluating tools. Thus, although it may be an objective indicator, it can hardly be an accurate impairment evaluation method considering that the cause of pain-related impairment is pain itself.

Therefore, it was decided to borrow the upper extremity part for diagnostic criteria but to adapt the pain chapter for the actual evaluation procedure. However, the evaluation system in the pain part was too complicated to be applied to real cases. Thus, a new pain-related impairment classification scheme was created by condensing the complicated process in the pain part into a table and improving the pain-related impairment classification scheme. The classification scheme in the pain part is composed of five items: severity of pain, ADLs, emotional distress, treatment, and pain behavior. There was an opinion to adopt the scheme as it is, however, in order to minimize the room for misapplication due to the characteristic of pain-related impairment, it was made a rule to quantify each item and represent in the concept of total score.

The severity of pain is determined using a pain scale available in medical records. Pain reporting may vary according to demographic and personal factors (9, 10). Evidence suggests that past pain experiences influence the rating of pain severity (11). Therefore, pain scale is considered to be a multidimensional construct and simple pain measures are viewed with skepticism (12). However, we cannot help using the most common pain scale when the severity of pain is estimated from the past medical records. Many clinicians have used a VAS to generate a quantitative measure of pain. This method appears to be useful to track changes in pain over time and very convenient. If the pain scale in medical records is not VAS but a different one, such as McGill Pain Questionnaire, the intensity of pain should be estimated separately in the part of intensity of pain.

ADL was evaluated using the Korean version of Modified Barthel Index (K-MBI). There are several methods developed for objective and accurate evaluation of ADLs, and among them, MBI, Functional Independence Measure, and Karz Index are widely used worldwide (13). In particular, MBI has been used in many countries because it has been proved to be reliable and valid (14, 15) and is free of royalty or copyright (16). K-MBI was developed by Jung et al. (17) in 2007.

Emotional distress is evaluated using Beck Depression Inventory (BDI). Depression is prevalent among persons with chronic pain (18, 19) and is often difficult to accurately assess in this population as many of the symptoms of chronic pain and depression overlap. Among patients with chronic pain, researchers have found that somatic symptoms of depression on inventories such as the BDI and Zung Self-Rating Depression Scale are correlated significantly with measures of pain severity, while the cognitive/affective items are not related (20, 21). As a self-report measure of depression, the BDI is widely used even among persons with medical conditions (22). And two studies found that the BDI discriminates between chronic pain patients with and without depression with a high degree of accuracy (23, 24).

The intensity of pain is measured using not only a subjective questionnaire but also the degree of pain treatment, which is the most objective data available in medical records. Because pain behavior can involve many subjective elements, it was given a half of the mark for other items. Lastly, the item of reliability was added to the evaluation procedure of the pain-related impairment, the score of which ranges from -10 to +10, based on the patient's pain behavior and reliability during impairment evaluation. The full mark was 100 points, and the conversion ratio to the upper extremity or lower extremity impairment will be decided later.

In conclusion, criteria for evaluating pain-related impairment suitable for the situation in Korea are developed, mainly based on the criteria in the fifth edition of *Guides*, adjusting items which are too complicated or hardly applicable and using additional scales for measuring ADLs and depression.

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■ Appendix 1 ■

Korean Modified Barthel Index (K-MBI)

No: _____ Name: _____ Age/Sex: _____

Diagnosis: _____ Date: _____ Examiner:

	1	2	3	4	5
Parameter	Unable to perform task	Substantial help required	Moderate help provided	Minimal help required	Fully independent
1. Personal hygiene	0	1	3	4	5
2. Bathing self	0	1	3	4	5
3. Feeding	0	2	5	8	10
4. Toilet	0	2	5	8	10
5. Stair climbing	0	2	5	8	10
6. Dressing	0	2	5	8	10
7. Bowel control	0	2	5	8	10
8. Bladder control	0	2	5	8	10
9. Ambulation	0	3	8	12	15
9. or Wheelchair*	0	1	3	4	5
10. Chair/Bed transfer	0	3	8	12	15
Total					

*, Score only if patient is unable to ambulate and is trained in wheelchair management.

■ Appendix 2 ■

Beck Depression Inventory

Choose one statement from among the group of four statements in each question that best describes how you have been feeling during the past few days. Circle the number beside your choice.

1	0. I do not feel sad. 1. I feel sad. 2. I am sad all the time and I can't snap out of it. 3. I am so sad or unhappy that I can't stand it.	12	0. I have not lost interest in other people. 1. I am less interested in other people than I used to be. 2. I have lost most of my interest in other people. 3. I have lost all of my interest in other people.
2	0. I am not particularly discouraged about the future. 1. I feel discouraged about the future. 2. I feel I have nothing to look forward to. 3. I feel that the future is hopeless and that things cannot improve.	13	0. I make decisions about as well as I ever could. 1. I put off making decisions more than I used to. 2. I have greater difficulty in making decisions than before. 3. I can't make decisions at all anymore.
3	0. I do not feel like a failure. 1. I feel I have failed more than the average person. 2. As I look back on my life, all I can see is a lot of failure. 3. I feel I am a complete failure as a person.	14	0. I don't feel that I look any worse than I used to. 1. I am worried that I am looking old or unattractive. 2. I feel that there are permanent changes in my appearance that make me look unattractive. 3. I believe that I look ugly.
4	0. I get as much satisfaction out of things as I used to. 1. I don't enjoy things the way I used to. 2. I don't get any real satisfaction out of anything anymore. 3. I am dissatisfied or bored with everything.	15	0. I can work about as well as before. 1. It takes an extra effort to get started at doing something. 2. I have to push myself very hard to do anything. 3. I can't do any work at all.
5	0. I don't feel particularly guilty. 1. I feel guilty a good part of the time. 2. I feel quite guilty most of the time. 3. I feel guilty all of the time.	16	0. I can sleep as well as usual. 1. I don't sleep as well as I used to. 2. I wake up 1-2 hours earlier than usual and find it hard to get back to sleep. 3. I wake up several hours earlier than I used to and can not get back to sleep.
6	0. I don't feel I am being punished. 1. I feel I may be punished. 2. I expect to be punished. 3. I feel I am being punished.	17	0. I don't get more tired than usual. 1. I get tired more easily than I used to. 2. I get tired from doing almost anything. 3. I am too tired to do anything.
7	0. I don't feel disappointed in myself. 1. I am disappointed in myself. 2. I am disgusted with myself. 3. I hate myself.	18	0. My appetite is no worse than usual. 1. My appetite is not as good as it used to be. 2. My appetite is much worse now. 3. I have no appetite at all anymore.
8	0. I don't feel I am any worse than anybody else. 1. I am critical of myself for my weaknesses or mistakes. 2. I blame myself all the time for my faults. 3. I blame myself for everything bad that happens.	19	0. I haven't lost much weight, if any, lately. 1. I have lost more than five pounds. 2. I have lost more than ten pounds. 3. I have lost more than fifteen pounds. (Score 0 if you have been purposely trying to lose weight.)
9	0. I don't have any thoughts of killing myself. 1. I have thoughts of killing myself, but I would not carry them out. 2. I would like to kill myself. 3. I would kill myself if I had the chance.	20	0. I am no more worried about my health than usual. 1. I am owrried about physical problems such as aches and pains, or upset stomach, or constipation. 2. I am very worried about physical problems, and it's hard to think of much else. 3. I am so worried about my physical problems that I cannot think about anything else.
10	0. I don't cry any more than usual. 1. I cry more now than I used to. 2. I cry all the time now. 3. I used to be able to cry, but now I can't cry even though I want to.	21	0. I have not noticed any recent change in my interest in sex. 1. I am less interested in sex than I used to be. 2. I am much less interested in sex now. 3. I have lost interested in sex completely.
11	0. I am no more irritated by things than I ever am. 1. I am slightly more irritated now than usual. 2. I am quite annoyed or irritated a good deal of the time. 3. I feel irritated all the time now.		

Scoring. 1-10, These ups and downs are considered normal; 11-16, Mild mood disturbance; 17-20, Borderline clinical depression; 21-30, Moderate depression; 31-40, Severe depression; >40, Extreme depression.