

Fibromyalgia in Pain Therapy

Mechanisms and Treatment Options in Laser Therapy

Introduction

Fibromyalgia is one of the most common chronic pain disorders. In Europe, the assessments for a disorder rate range between 10 and 13%; in the United States of America, this proportion is merely 2%. Women, who mostly have the onset of disease between 20 and 35 years of age, are predominantly affected at a ratio of 8:1.

The term fibromyalgia is derived from its components, *fibra* = fibre, *myos* = muscle and *algos* = pain and, therefore, its naming already indicates the localisation of the complaint.

Symptoms

The onset of the diseases mostly occurs subtly as unspecific symptoms, exhaustion and sleep disorders; gastrointestinal tract symptoms also arise at a later stage. Typical pains first develop in the arms and legs after a latency period, later they are also distributed over the torso.

When the full picture is acquired, it is common that seven to eight years expire before the syndrome will have spread from depressive alienation to manifest depression and partially severe vegetative disturbances. Organ or tissue damages are also undetectable by sweeping diagnostic measures and procedures, which also leads to stigmatism of the affected patients.

- Initial unspecific complaints, exhaustion, sleep disorders.
- Morning stiffness, subjectively sensitised swelling of the hands, arms and legs.
- Subjective discomforts, such as pins and needles as well as numbness predominantly in the hands.
- Nervous extremities (restless legs), spasms in the leg musculature.
- Tense headaches in the temples and occipital region.
- Violent pain attacks interspersed with periods that show little pain or are even painless.
- Chills, wetness or external stress that leads to aggravation.
- Hoarseness, difficulties in swallowing, lumpy sensation in the throat, ear ringing (tinnitus).
- Cardiac rhythm disturbances, dyspnoea
- Gastrointestinal disturbances, irritable bladder.
- Sensitive skin, alopecia, increased perspiration.
- Fatigue and incapacity.
- Severe physical and mental exhaustion after mild tension.
- Rare somnolence, frequent hypersomnia.
- Cognitive and concentration disturbances, depressive alienation.
- Tendency to develop intolerance and pseudo-allergies.
- Reduced sexual interest.

Causes

The cause of the symptoms is unknown; indications of infectious, immunological or hormonal imbalance are being discussed. To date, the theory of experiencing an infectious disease caused by Streptococci or Borrelia could also neither be confirmed nor contradicted. In terms of energy, evidence is traced to a genetic contribution. Therefore, in affected patients, significant mutations at chromosome 22 (COMT-GEN, position 158 Val/Met), which have also been established in the ADHS

hyperactivity syndrome, could be proven. These probably lead to cognitive alteration and, finally, also to a related increase in the subjective pain sensation.

It remains unclear why in these observations it regularly leads to premature exhaustion in the physical capacity. In this case, psychological grounds are predominantly discussed.

Therapy

Since the diagnosis of the condition proceeds mainly at a late stage due to the subtle progress, besides the specific symptoms of the disease, the subsequent damages of the chronification, that has already occurred, are also frequently relevant and, hence, subject to therapy. Physical permanent damage and signs ranging from medication abuse to addiction are commonly manifest due to long-term medical treatment with different pain-killers.

A causal therapy in accordance with generally valid standards or directives is currently unfeasible; however, different aspects are advocated within the scope of a multimodal therapy:

- Economical use of conventional analgesics such as NSAR.
- Abstinence from opiates, especially at stage III as according to WHO in order to prevent the euphoric side effects or perceived sleep inducement.
- Antidepressive therapy using tricyclic or modern serotonin reuptake inhibitor.
- Antineuropathic treatment by Gabapentin or Pregabalin
- Cryotherapy (cold room), physical therapy.
- Muscle relaxation and lymph drainage.
- Psychotherapeutic and psychosomatic concomitant treatment for systematic stress intensification.

Pathophysiological considerations

Fibromyalgia is expressed – as considered from a purely physical aspect – by pains and rapid exhaustion of the muscle system, even after mild exertion. If the muscle structure is taken into consideration, then this exists as individual fibres made from a multitude of myofibrils, which – for their part – consists of individual actin filaments bound to one another and interspersing myosin filaments.

The muscle contraction is achieved by the filament sliding over one another, which is accompanied by a corresponding muscle shortening. The precondition for this process is a constant supply of adenosine triphosphate (ATP), which is stored in the ribosomes of mitochondria, which are specific to the muscles. The energy obtained from ATP is simply sufficient for a few muscle contractions. If the supply is depleted, the muscle cell searches for other energy sources: creatine phosphate (CP) is first used as a resort, by which the energy-deficient adenosine diphosphate (ADP) is converted to ATP, which is essential for energy delivery when the demand is persistent. If creatine phosphate is also dwindling, the *anaerobic* metabolism – instead of the current aerobic metabolism – becomes effective. During this process, the muscle cells acquire ATP, by which glucose is converted to lactic acid (lactate), which accumulates in the muscle fibres and finally leads to acidosis and constant pain. The energy balance resulting from this process may not cover the demand permanently: whereas 38 ATP molecules exist in aerobic metabolism of one sugar molecule, the anaerobic conversion simply brings about the formation of 2 ATP molecules from a sugar molecule. It leads to a constant energy deficit.

If it is considered that even the muscle fibre tension is an energy-consuming process, it is obvious that in the worst situation, oxygen demand of the muscle is not in a resting position or only insufficiently achieved. The result is a constant energy crisis of the musculature system with permanent contractions, continuous pain and formation of “hot spots” supplied with a minimum amount of blood, the triggering or even the tender points which are pathognomic for fibromyalgia.

Implications for fibromyalgia therapy

The disturbed energy balance of the muscle is successfully improved by a suitable process if the continuous contractions and, therefore, constant pain were also required to be alleviated. It is known from sports sciences that the performance of sportspersons is improved by laser light irradiation that targets the muscular system. If this technique is supplemented by additional acupuncture at acupuncture points relevant to fibromyalgia and the energy yield of this process increases by intravenous laser irradiation of the mitochondria located in the blood cells, a minimum adjuvant process would also be found for the treatment of fibromyalgia.

The objective of a current observation, therefore, should be the documentation of the fibromyalgia symptomatology by combining intravenous laser application, laser irradiation of the muscles and laser acupuncture.

The Schmerzzentrum Celle is a facility, in which only patients suffering from chronic pain disorders have been treated by multimodal and interdisciplinary directives for more than 10 years. Besides processes involving medication, practically all interventional and many complementary therapy forms are also applied. Another focal point is the traditional Chinese acupuncture, which is also applied to a wider extent in accordance with the directives of the Bundesärztekammer (Federal Medical Board), corresponding to the indication list of the World Health Organisation (WHO). All patients experience an intensive initial survey as well as a standardised process control, which also includes a psychological pain profile. The previous as well as current pain extents, pain disability index (PDI), sensory and affective components, the von Zerssen vegetative score, the depression index (ADS) as well as the Gerbershagen chronification stage are also documented in all patients.

Data sheet: M. Mustermann, born on 16.05.1942

- MPSS: chronification stage 3 is present at the time of the initial study.
- Last psychological test: highly affective pain evaluation
- Special points of note: high depression value

		Onset : 2008	Quarter:																	
Psychological test	Pain scale	Value: 0 up to 10	6																	
	Well-being	Value: 0 up to 10	3																	
	Confinement (PDI)	Standard value: up to 5	8.0																	
	Veg. score (von Zerssen)	Standard value: M<24,F<28	42																	
	Affective components	Standard value: up to 42 P	49																	
	Sensory components	Standard value: up to 42 P	22																	
	A-SES / S-SES Quotient	Standard value: up to i	2.2																	
	Depressivity (ADS)	Standard value: up to 23 P	38																	
Therapy schedule	Meaningful addictive/ withdrawal behaviour																			
	Phamacotherapy	X																		
	Therapeutic localised anaesthesia																			
	Invasive procedures																			
	Acupuncture	X																		
	Physiotherapy																			
	Psychotherapy	X																		
	Social work																			
	Other	X																		
Stationary therapy																				

Fig.: Regular psychological pain profile given at the beginning of the therapy and in other processes.

Axis	Item	Description	Value		Stage			
1	Temporal aspects	Frequency of incidence	Once per day or rarer	1	3	Axes - sum	Axes - stage	Total of axial stages 10
			Several times per day	2				
			Permanent	3				
	Duration	Up to several hours	1	3	7	3		
		Several days	2					
		Longer than one week or permanent	3					
	Intensity change	Frequent	1	1				
		Occasional	2					
		Never	3					
2	Spatial aspects	Monocular	1	3	3	3	Total chronic stage (MPSS): 3	
		bilocular	2					
		multilocular or panalgesia	3					
3	Med. consumption behaviour	Medication consumption	Irregular consumption of a max. 2 peripheral analgesics	1	1	2		1
			max. 4 peripheral analgesics, maximum of 2 regular	2				
			Regular, more than 2 peripheral Analgesics or analgesics affecting the central nervous system	3				
		Number of withdrawal treatments	none	1	1			
			one	2				
			More than one withdrawal treatment	3				
4	Patient medical history	Change of family doctor	No change	1	3			
			max 3 changes	2				
			More than 3 changes	3				
		Hospital stay caused by pain	Up to 1	1	2			
			2 to 3	2				
			More than 3	3				
		Operations due to pain	Up to 1	1	1		3	
			2 to 3	2				
			More than 3	3				
		Rehabilitation measures due to pain	None	1	3			
			Up to 2	2				
			More than 2	3				

Fig.: Census of the Gerbershagen chronification index at the onset of the disease.

Methodology

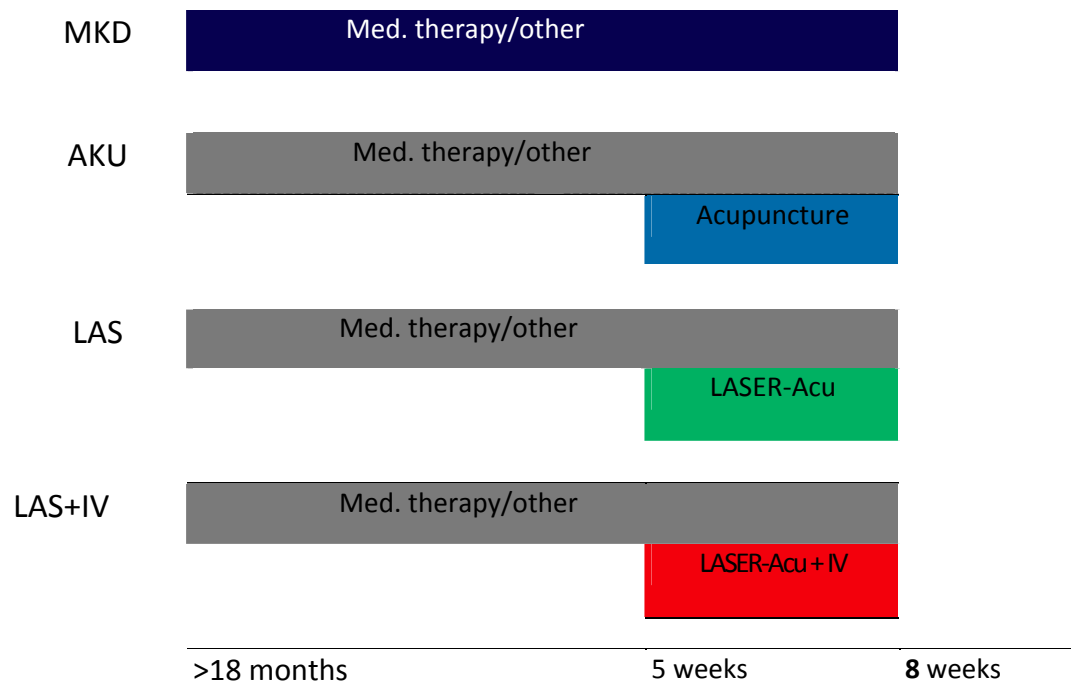
In the observed patients, it is without exception a matter of such cases, in which fibromyalgia has been diagnosed by the centre director either as a primary disease or as a reactive disorder accompanied by other pain conditions. Overall, 246 patients, who have received medication treatment as well as physical therapeutic measures and, if necessary, psychotherapy or conventional acupuncture, could be reprocessed within the scope of a retrospective view.

The average duration of an illness was 8 years; an average 6 pre-therapy experts have performed medication procedures (99%), physical therapy (86%), psychotherapy (22%) or other procedures (20%).

In another group, 82 patients have *also* been treated with the measures mentioned above, using acupuncture.

From the prospective side of the observation, 72 patients have received laser treatment either as a purely percutaneous therapy at specific acupuncture points or as a combined procedure using intravascular blood irradiation.

The Webermedical weberneedle® blood system is applied successfully as a LLLT, using **red-laser (632.8 nm) and green laser (532 nm) irradiation as well as the percutaneous** application of a weberneedle® acupuncture laser needle appliance from the same company, which consists of 6 red-light and 6 infrared laser diodes. Each patient received 10 acupuncture laser treatments as well as a minimum of three intravasal irradiation operations in the pertinent observation group. The treatment duration was limited to five weeks.



Therapy structure: All patients have received the customary medication procedure (MED), a number received an additional needle acupuncture (AKU) or laser acupuncture (LAS) or a combination of laser acupuncture and intravasal laser irradiation (LAS+IV).

Observations

The symptoms of “pain”, “vegetative disorder” and “depression”, which are related to the fibromyalgia syndrome, should be provided as examples in this situation.

1. Pain

During treatment, the average pain intensity decreased significantly on the visual analogue scale (VAS) in all treatment groups as compared to the initial study, in which the pain characteristic showed the minimum value in the group, which was also treated with laser light.

	Onset	End
MED	8.7	6.8
AKU	8.5	6
LAS	8.5	4.4
LAS+IV	8.9	2.9

MED = medication procedure, AKU = needle acupuncture, LAS = laser acupuncture, LAS+IV = combination of laser acupuncture with intravasal laser irradiation.

2. Pain Disability Index

Within the scope of the von Zerssen vegetative score, vegetative disturbances, such as excessive perspiration, tachycardia, globus sensation, etc., have been claimed to have undergone significant improvement due to all acupuncture treatment with and without laser as compared to the initial study, in which the medication treatment only led to a marginal change of the original value.

	Onset	End
MED	54	51
AKU	48	36
LAS	49	35
LAS+IV	52	22

MED = medication procedure, AKU = needle acupuncture, LAS = laser acupuncture, LAS+IV = combination of laser acupuncture with intravasal laser irradiation.

3. Depression Index

The frequently occurring depression accompanying fibromyalgia decreased most significantly especially in groups treated with laser acupuncture or a combination of laser acupuncture and intravenous laser irradiation.

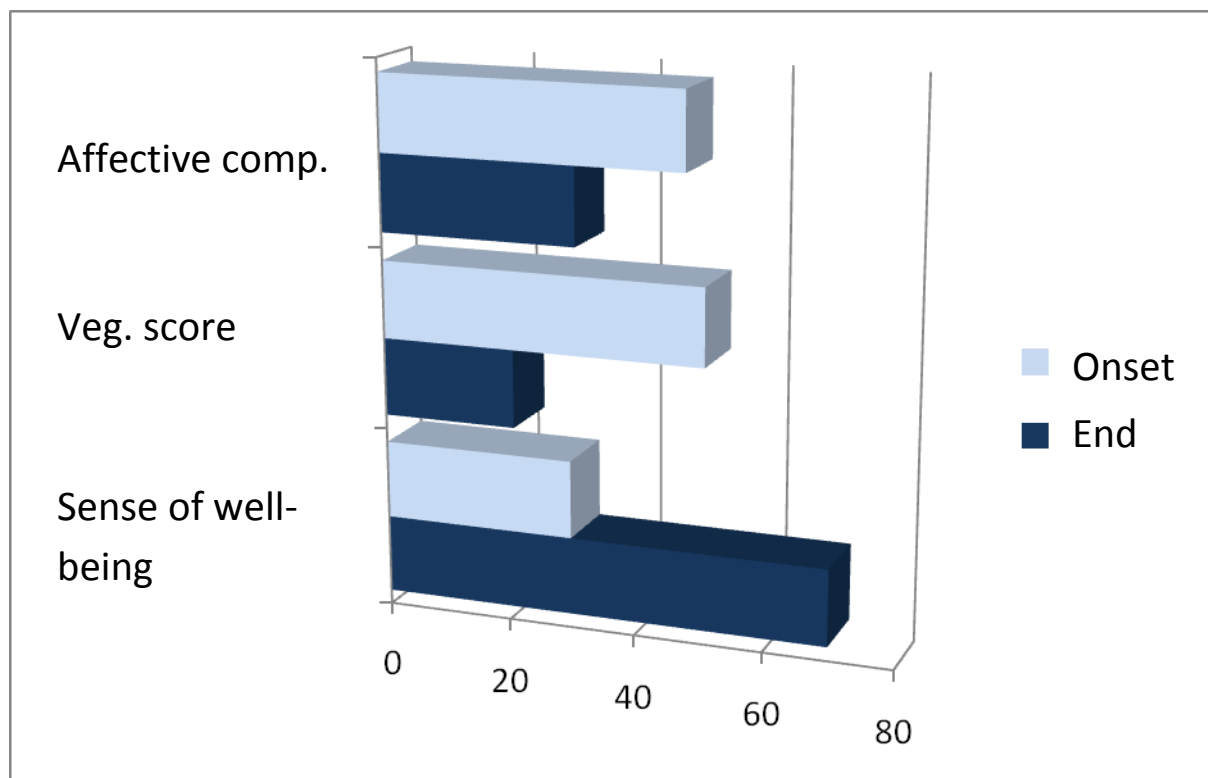
	Onset	End
MED	34	23
AP	37	24
LAS	42	12
LAS+IV	40	12

MED = medication procedure, AKU = needle acupuncture, LAS = laser acupuncture, LAS+IV = combination of laser acupuncture with intravasal laser irradiation.

4. Complete Overview of Laser Acupuncture with Intravasal Laser Irradiation

When measured on the score estimated by the patients themselves for affective and vegetative adverse effects as well as for their general well-being, all values of the combined laser treatment after five weeks showed a significant improvement when compared with those at the beginning of the therapy.

	Onset	End
Sense of well-being	30	70
Veg. score	51	21
Affective comp.	48	31



Conclusions

The current procedures to treat fibromyalgia primarily consist of medication, physiotherapeutic and psychological therapeutic forms, which cannot always achieve a significant reduction of the symptoms; however, from experience, they mostly prevent aggravation. According to the classical Chinese model, the needle acupuncture treatment represents another option to limit the individual symptoms. By observing the individual patient groups, however, a slightly limited tolerability of the pain stimuli associated with the application was often produced. According to references as well as the very needle treatment experiments, even better results are achieved in a comparative manner and to a certain extent by using laser acupuncture treatment. The intravasal blood irradiation using red light and green lasers has also been capable of accomplishing a significant advantage in the symptoms of the condition, which especially affect the patients. This is especially demonstrated in the general well-being, which improved by approximately a factor of 3. An energetic concentration of the cell lines present in blood and the accompanying improvement and acceleration of ADP conversion to ATP seems to have considerable effects both in the muscular system as well as in other different factors.

The observations presented in this work do not fulfil the prerequisites for a controlled application observation or for a treatment study. However, they show a significantly positive trend for a clinical record that is only otherwise difficult to treat. Therefore, the contents of further studies are required for the processing of a stringently prospective representation in the treatment process of fibromyalgia using controlled methods.

Within the scope of the effective covenant in the quality assurance agreement of our institute, another aspect not to withhold recognised therapeutic forms is required to be open also: is the combination of laser acupuncture and intravasal laser treatment in the position to also improve fibromyalgia symptoms without the accompanying conventional procedures?

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