



# Medical Acupuncture

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## Acupuncture With Shockwaves: A New Method for the Stimulation of Acupuncture Points

Heinrich Everke, PhD

### ABSTRACT

**Background:** Acupressure and acupuncture are established medical techniques that use pressure-sensitive points on the surface of the body to achieve an effect on the whole organism. Shockwave therapy is a new technology that was initially introduced to destroy kidney stones. For several years, a milder form of shockwaves (ballistic shockwaves) has been in use in orthopedic pain therapy. Evolved from 5 years of empirical study is a new method to stimulate pressure-sensitive acupuncture points with pneumatically generated pressure pulses: extracorporeal pulse activation therapy (EPAT).

**Objectives:** To determine whether the stimulation of acupuncture points with mild ballistic shockwaves is as effective as acupuncture with needles, and to determine any precautions and side effects.

**Design, Setting, and Participants:** Two uncontrolled pilot studies of EPAT in arthritis. The first, from October 2003–May 2004, included 22 patients with confirmed gonarthritis, aged 30–88 years (12 men and 10 women). The second study focused on 20 patients with chronic pain in the hip joint (coxarthritis).

**Interventions:** In the gonarthritis study, selection of points for the application of shockwaves was the same as with classical acupuncture, typically BL 40, GB 34, ST 36, SP 6, SP 9, and 3 local points around the patella. Every point was stimulated 3 times with shockwaves for 5–10 seconds. Treatment was repeated every second or third day. Most had 12 treatments or fewer. In the coxarthritis study, the following points were selected: BL 23, BL 25, GB 30, GB 29, GB 31, and GB 34. Treatment was repeated every second or third day over 2 weeks. In some cases, up to 12 treatments had to be administered.

**Main Outcome Measures:** The effect of EPAT on pain and mobility of joints in patients with gonarthritis and coxarthritis.

**Results:** Three months after the end of the treatment, 72.8% of the gonarthritis patients reported less pain. The mobility of the knee joint improved by an average of 19.1° and mobility of the hip joint had also improved. Fifteen of 20 patients with coxarthritis were almost without pain after 4 weeks of treatment. In both studies, younger patients ( $\leq 65$  years) achieved better results than older patients.

**Conclusions:** The stimulation of acupuncture points with EPAT seems to be an effective addition to treatment options in acupuncture. Further studies are necessary to identify the diseases for which EPAT may complement classical needle acupuncture and to determine additional applications in acupuncture opened up by this new method.

**Key Words:** Acupuncture, Extracorporeal Shockwaves, Ballistic Shockwaves, Pressure Waves, Gonarthritis, Coxarthritis

## INTRODUCTION

ABOUT 30 YEARS AGO, a new method, extracorporeally generated shockwaves, was introduced for medical therapy. In the beginning, these waves were used primarily to disintegrate kidney stones. Some years later, when smaller devices to generate shockwaves were invented, shockwaves could also be used for the treatment of tendons and ligaments or trigger points, as well as some other orthopedic diseases.<sup>1-3</sup> This type of treatment is now used successfully for various human conditions and in veterinary medicine.

The application of extracorporeal shockwaves to acupuncture points is a new method of stimulation. Extracorporeal pulse activation therapy (EPAT) uses mild and short pulses of extracorporeal shockwaves to stimulate pressure receptors in the skin, muscles, tendons, and vessels to generate reactions that are similar to needling but more effective in certain cases.

Shockwaves are acoustic waves that derive, for example, from thunderstorms or the sounds from an explosion or the "bang" that occurs when a supersonic aircraft breaks the sound barrier. Their energy can cover long distances. Solid material and water are excellent conductors for this type of waves, whereas wave propagation is severely inhibited in air. In this, they have some similarity to ultrasound waves but their power is 100 to 1000 times stronger (Figure 1).

There are 2 different types of shockwaves used in medical treatment: electrohydraulic shockwaves and ballistic shockwaves.<sup>2-4</sup> Electrohydraulic shockwaves are generated by an electric spark. If the spark discharge occurs in water, the pulses thus generated can be focused and directed at, for example, kidney stones. They penetrate the skin without causing any lesions. The devices used for these applications are big and the energy output is high.

Ballistic shockwaves are generated by a projectile that is shot against the rear side of a small metal plate. This plate, i.e., the applicator, applies the pulses to the target. Ballistic shockwaves are milder than electrohydraulic shockwaves. The devices to generate these waves are much smaller and easy to handle on the skin (hence their use for stimulation of acupuncture points).

The device with which the following studies were carried out was a Masterpuls 100 (Storz Medical Company, Tägerwil, Switzerland), for which the applicator was adapted to use on acupuncture points. The tip of this special applicator has a diameter of only 6 mm.

## METHODS

### Initial Studies and Applications

#### Gonarthrosis

Observations have been made since 2001 on the treatment of different cases of painful joint afflictions with EPAT. From October 2003 to May 2004, I conducted an uncontrolled study of 22 patients with gonarthrosis confirmed via arthroscopy and radiology of more than 6 months' duration. The 12 men and 10 women were aged 30-88 years (mean, 64.5 years).

Patients with acute inflammation of the knee were excluded. The study aim was to determine whether the stimulation of acupuncture points using ballistic shockwaves achieved results comparable with those of needle acupuncture.

Selection of points for the application of shockwaves was the same as with classical acupuncture. The typical combination of points was BL 40, GB 34, ST 36, SP 6, SP 9, and 3 local points around the patella. Every point was stimulated 3 times with shockwaves for 5-10 seconds (30-60 impulses were directed at every point). The pressure was high enough to produce a feeling of vibration in the area. Stimulation was stopped when the patient felt any pain. The treatment was repeated every second or third day, and most patients had 12 treatments or fewer.

The patients were asked about pain when moving and at rest. Pain was evaluated using a questionnaire on a scale from 1 to 10 before the treatment, and after the 6th and 12th treatments. The range of movement of the knee joint was measured before and after the treatment. The patients were also questioned about the distance they were able to walk before and after treatment. Patients were again questioned 3 months after the end of treatments regarding long-term results.<sup>5</sup>

#### Coxarthrosis

After ascertaining the results of my study on gonarthrosis, I conducted a second uncontrolled study of the treatment of coxarthrosis in 20 patients with chronic pain in the hip joint. The study aim was whether the sole stimulation of acupuncture points using ballistic shockwaves was able to reduce pain and improve mobility of the hip joint. Selection of points was based on the Chinese syndrome diagnosis: BL 23, BL 25, GB 30, GB 29, GB 31, and GB 34. Depending on the modalities of the disease, some personal points could have been added but no more than 12 points

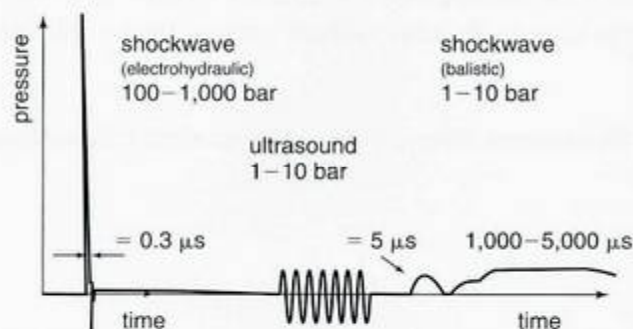


FIG. 1. Measurement of shockwaves compared with ultrasound waves.

were selected. Treatment was repeated every second or third day over 2 weeks. In some cases, up to 12 treatments had to be administered.

## RESULTS

### Gonarthrititis

At baseline, 10 of the 22 patients had pain even without moving the knee. Pain while moving the knee was reported by all the patients at an average of 6.5; pain was measured by a questionnaire on a scale from 0 to 10 (0 = no pain, 10 = maximum pain).

Two weeks later, severity of pain was reduced to 2.8, and after 4 weeks, it was reduced to 1.8. Eight of the 22 patients were completely without pain after 12 treatments. The youngest patient, a 30-year-old man, had no pain after only 2 treatments. Two patients reported aggravation of pain after 2-4 treatments and ceased participation. After 4 weeks of treatment, only 2 patients reported pain at rest.

The range of mobility of the knee joint, which was measured at baseline and at the end of the treatment, had improved an average of 19.1°. The younger the patient, the better the effect. Walking distance also seemed to improve, but measuring this parameter was too uncertain under the circumstances of this study to take it into account.

After 3 months, 16 patients (72.8%) still reported good results. The results were better than my results with needle acupuncture alone.<sup>5</sup> The speed of improvement, extent of pain reduction, and relief of contractions was good, especially in younger patients ( $\leq 65$  years).

### Coxarthrititis

The results in coxarthrititis were even better than in gonarthrititis. Fifteen of 20 patients were nearly pain-free after 4 weeks. Only 8 patients needed 10 or more treatments. Patients with the best results were aged 65 years or younger, which may mean that older patients with prolonged coxarthrititis and destruction of great parts of the joint will still need an endoprosthesis (Table 1). Nevertheless, it appears worthwhile to try EPAT before the patient undergoes surgery.

### Side Effects

More than 1000 EPAT procedures were performed without any clinically relevant side effects, provided that the intensity of the pressure pulses was selected correctly. Areas located directly above bones (e.g., skull) were avoided because of the sensitivity of the periosteum. Areas above the lung or large blood vessels were avoided because earlier experiments with the very hard electrohydraulic shockwaves had caused some ruptures of vesicles in the lungs of animals and there was some theoretical danger of mobilizing plaques or thrombi in the larger vessels. The stimulation of an inflamed area could lead to increasing pain and should

TABLE 1. RESULTS OF EPAT TREATMENT FOR COXARTHITIS\*

Patient	Sex/Age, y	Affected side	No. of treatments	Results
Patients $\leq 65$ y				
1	F/62	Left	12	No pain
2	F/62	Left	10	No pain
3	M/65	Left	5	No pain
4	F/57	Left	8	No pain
5	M/50	Left	11	Better
6	F/62	Both	12	Better
7	F/50	Left	4	No pain
8	F/55	Left	4	No pain
9	F/55	Left	12	No pain
10	F/60	Left	6	No pain
11	F/60	Left	7	No pain
12	M/60	Both	12	No pain
13	F/65	Left	9	No pain
14	F/62	Left	4	No pain
15	M/40	Right	6	No pain
16	F/60	Right	4	No pain
Patients $> 65$ y				
17	F/80	Both	12	No effect
18	F/80	Both	6	No pain
19	F/70	Both	12	No effect
20	M/85	Left	5	No effect

\*Adapted from Everke.<sup>8</sup>

be avoided. In a very few cases, small hematomas at the treated acupuncture point could be observed, especially when patients were taking anticoagulants.

## DISCUSSION

There are different theories about the anatomical and histological correlates of acupuncture points. And there are different theories about the mechanism of action that is provoked by inserting a needle into a point. Pothmann<sup>6</sup> suggests that acupuncture points are composed of a great number of different receptors (pain, temperature, pressure receptors). In the case of ballistic shockwaves especially, the pressure receptors are stimulated.

I believe that mild ballistic shockwaves had an advantage over acupuncture with needles because they reach a greater number of pressure receptors in the tissue with higher pressure than needles, and these pressure receptors are stimulated by their adequate stimulus. Thus, they "understand" the message better. Additionally, many of the main acupuncture points for the treatment of pain and stiffness of the hip and knee are either quite big in diameter as, for example, GB 30, or, points with the same indication are located very close together as, for example, LR 8, SP 9, and KI 10. The pressure impulses reach all the pressure receptors in the area simultaneously.

In the case of gonarthrititis and coxarthrititis, pain is caused mainly by the stiffness of the joints caused by the constriction of muscles and tendons. The destruction of cartilage is a further step in the process.<sup>7</sup>

Ballistic shockwaves, which are aimed at the most sensitive accumulations of pressure receptors that are connected to the joints (the acupuncture points) can cause a reflex able to widen the contracted capsule of the joint. This mechanism could explain why the treatment was more successful in younger than in older patients.

The results of these 2 studies show that mild ballistic EPAT directed at acupuncture points can treat pain and the reduction of mobility in arthritis of big joints. However, pressure receptors are not only located in tendons and muscles but also in the skin and connective tissue and many other areas of the body. Pressure pulses allow a variety of body reactions to be controlled: muscular tension, dilatation or constriction of blood vessels, bronchial dilatation or constriction, intestinal activity, bladder activity, etc.

Consequently, the list of indications for this type of therapy is long. I have collected data on EPAT for the treatment of the following diseases: arthritis of large joints; bronchial asthma; cervical syndrome; foot reflex zone therapy; incontinence; carpal tunnel syndrome; lumbago; tension headache; tennis elbow; calcaneal spur; tinnitus; and wound-healing disorders.

The principles for the selection of the points to be treated with EPAT are the same as those followed in classical acupuncture. Similar to classical acupuncture, EPAT also allows the intensity of stimulation of an individual point (stimulating or sedative) to be controlled by using either weak pulses that have stimulating effect or strong pulses with a sedative effect. Moreover, EPAT can be easily used in combination with classical needle acupuncture and all other therapy methods. So, if this way to stimulate acupuncture points is really more effective (as was my impression from my own observations comparing needling to EPAT), then should this not be further investigated?

## CONCLUSIONS

EPAT is a new procedure for the stimulation of acupuncture points. EPAT complements traditional methods such as

moxibustion, acupressure, laser acupuncture, and electroacupuncture and thus extends the spectrum of therapy options. Further studies are necessary to identify the diseases for which EPAT may complement classical needle acupuncture and to determine additional applications in acupuncture opened up by this new therapy.

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