Book review

Shock wave applications in musculoskeletal disorders

Jan-Dirk Rompe, 82 pages, Thieme Verlagsgruppe 2002
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The enthusiasm aroused by the enormous success of shock wave treatment (SWT) of renal concrements has naturally spilled over to other fields of medicine. Recently, the US Food and Drug Administration approved SWT for heel pain, and in many countries, SWT has turned into an orthopedic milk cow. In Germany, for instance, about 100,000 patients are given SWT annually for musculoskeletal disorders, which is more than for renal concrements. In a recent 82-page book, *Shock Wave Applications in Musculoskeletal Disorders,* Dr Jan-Dirk Rompe presents a theoretical background of shock waves and a series of clinical and experimental articles. Personally, I think that such a disposition of a book is not very easy to read. It is often not clear whether the material has been published elsewhere, it is difficult to obtain an overview without abstracts, and the reader does not have the benefit of a peer-review and a fretful and fault-finding editor. In Dr Rompe's book, the individual articles are, in my view, somewhat long and hard to read. According to the blurb, SWT is a "New, evidence-based option for nonsurgical treatment of orthopaedic disorders…" I do not think that Dr Rompe's book provides convincing evidence for such a bold statement.

In SWT lithotripsy, assessment is straightforward: the disintegration of the concrement is easy to measure. In musculoskeletal disorders, the main outcome variable—pain—is, alas, radiolucent. This is a key point that merits a thorough discussion, which would have been nice in a survey of SWT in orthopedics. In general, uncontrolled orthopedic trials have a success rate of about 70–90%, single-blinded studies usually have poorer results, and double-blinded trials fare still worse. In a recent randomized placebo-controlled, double-blind study on lateral epicondylitis, SWT was found to be inefficient: in both groups, about one third of the patients improved. Both the doctor and the patient, naturally, want the treatment to succeed. And if placebo is strong medicine, it is even stronger when given as surgery, or physical therapy. It is also well-known that even inadequate surgery makes 30–50% of the patients feel better—e.g., there are well-documented controlled trials with sham surgery for angina pectoris and knee osteoarthrosis. SWT machines are high-tech, noisy and SWT is often slightly unpleasant or even painful, which is important for the placebo effect.

The energy used in SWT for pain syndromes, usually 0.07–0.09 mJ/mm^2, is much lower than that used to crush stones, and the basic biological effects and its dose-response are little known. Dr Rompe contributes with two well-performed histological studies on the SWT effect on tendon and peripheral nerves: the SWT injury appears to have a nonspecific effect.

The mechanisms triggered by SWT are not yet understood. In the treatment of pain, denervation may also play a role. It seems likely that the effects, if any, depend on a graded local tissue injury with the release of growth factors and/or inflammatory mediators. Indeed, in the bad old days, most nonmalignant gastric ulcers healed, at least temporarily, after almost any surgery, because of the effects of local tissue injury.

SWT is also reported to save money. In a comparison between surgery and SWT for calcifying shoulder tendonitis, Dr Rompe reports an average hospital stay after SWT of 3 days, as compared with 12 days after local surgical extirpation of the calcium deposit. The results were otherwise about the same.

More promising are the possible osteogenic effects of SWT. In an ingenious experimental study using rabbit fibula segment resections, Dr Rompe reports that SWT (0.28 mJ/mm^3) stimu-

lated bone formation, while a dose of 0.08 did not. The strength of this study is that the assessment was blinded, unlike in the clinical studies with pain as an outcome parameter.

In an uncontrolled study on SWT in nonunions, 17 patients with fractures and 26 with osteotomies had not healed after 9 months, although they had received a higher dose (0.6 mJ/mm^2). After 4 months, 33/42 were radiographically healed. One can not draw conclusions from this study about the efficacy, effectiveness and efficiency of SWT. In most clinical trials, sampling has a greater effect on outcome than treatment, perhaps particularly so when studying nonunions with an unknown admixture of delayed unions. Therefore, large well-designed randomized studies, probably involving several hundreds of patients, are needed and these should be on the onus of the manufacturers and protagonists of a new treatment. A comparison between the introduction of pharmaceutical and orthopedic devices is perhaps slightly unfair, but nevertheless embarrassing. Typically, it takes nearly a decade to develop a new drug, and the test protocols are rigorous. How about orthopedic devices?

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