

Doctors Demystify

Journal Club 2019

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January, 2019: Does fluidotherapy improve hand function in patients with rheumatoid arthritis?

[Gunduz E et al aluminum splint: Is dry heat treatment \(fluidotherapy\) effective in improving hand function in patients with rheumatoid arthritis? A randomized controlled trial. Clin Rehabil. 2018 Nov 18;2692](#)

If you read these journal article reviews with any regularity (or attend DD Current Science), you know that I like randomized controlled trials to guide our clinical decision making. We need more Level I and Level II studies rather than relying on intuition or expert opinion. So I was glad to see this recent Level II study.

Turkish investigators randomized 93 patients with rheumatoid arthritis into two groups. Both groups participated in a joint protection and exercise program. This consisted of information and education regarding rheumatoid arthritis, methods of coping with pain and stress, relaxation and joint protection techniques, and gentle strengthening and stretching exercises for joint motion. Group I also received fluidotherapy 15 minutes daily, five days a week for three weeks. The control patients (Group II) were seen weekly for the first month, then monthly for monitoring.

Outcome measures were the Health Assessment Questionnaire, the Durouze Hand Index, the Disease Activity Score-28, and measures of pain, stiffness, and grip strength. These data were collected at base line and then again at three and twelve weeks.

The two groups were well matched regarding multiple characteristics, including age, disease severity and duration, frequency of exercise and analgesic administration, hand dominance, presence of deformity.

For baseline characteristics, Group I had a significantly poorer Health Assessment Questionnaire, otherwise there were no significant differences between the groups at the outset.

Forty patients in each group completed the study. At three weeks, the groups were both improved yet significantly identical for all measures. At week 12, the Durouze Hand Index scores were significantly better for Group II (control).

COMMENT: This was a carefully designed and executed study. The authors conclude that dry heat was not effective in improving hand function. They cite a 1992 article that found a similar result for the use of wax baths for patients with rheumatoid arthritis. For me, the bottom line is that patient education regarding coping and relaxing along with protecting, gently strengthening, and stretching joints is helpful. Two different heat modalities provide no added benefit yet have both temporal and monetary costs.

February, 2019: Does toe-to-hand transfer impair foot function? The patient's perspective.

[Tsai TY et al: Patient Reported Outcome Measures for Toe-to-Hand Transfer: a Prospective Longitudinal Study. *Plast Reconstr Surg.* 2019 Jan 21. doi: 10.1097/PRS.0000000000005422. \[Epub ahead of print\]](#)

Last week, doctors in Taiwan published the results of pre- and postoperative outcome questionnaires obtained from 23 patients undergoing toe-to-hand transfers following traumatic loss. In the past, objective measures (eg, strength, sensation measurements) or only postoperative outcomes have been reported. Thus the current study is unique and valuable in that it studied patient-rated outcome measures (PROMs) both before and after the free tissue transfers.

Forty-one patients received toe(s)-to-hand transfers at the investigators' hospital between 2012 and 2015. Twenty-three completed all of the questionnaires and are the subject of this study. Average age was 39, mean duration of follow-up was 2.7 years. In total, 34 toes (9 great toes, 20 second toes, and 5 third toes) were transferred. The recipient hand was dominant for 10 patients and nondominant for 13. A thumb or a combination of thumb and fingers were reconstructed in 9 patients, and only finger(s) were reconstructed in 14. The surgeons reconstructed one digit in 15 patients, two digits in 5 patients, and 3 digits in 2 patients. Every

patient required secondary surgeries for appearance, function, or both. This usually consisted of tenolysis and/or reshaping of the pulp.

The 3 Chinese-language-validated PROMs used were the Michigan Hand Outcome Questionnaire (MHQ), the 36-Item Short Form Survey (SF-36), and the Lower Limb Outcomes Questionnaire (LLOQ). The MHQ measures the patient's perception of hand function and appearance. The SF-36 evaluates the patient's physical, psychological, and mental status. The LLOQ enquires about the status of the donor foot/feet.

RESULTS: In general, patients with thumb reconstructions and those with reconstructions of their dominant hand scored better than the group as a whole, but not significantly greater.

The MHQ scores were statistically higher post-operatively for the domains of activities of daily living, work, aesthetics, and satisfaction. Scores for hand function and pain improved but did not reach statistical significance.

Although the SF-36 scores improved for all domains (physical function, physical role, emotional role, vitality, mental health index, social function, pain, and general health), only for the domains of physical and emotional roles did the results achieve statistical significance.

The LLOQ showed no statistically significant difference between pre- and postoperative foot function.

DISCUSSION: The authors note that PROMs focus on the patient's symptoms and life quality and are useful in helping the patient's and providers' decision-making process. Past studies have either neglected PROMs in favor of measures such as two-point discrimination, pulp-to-pulp function, and strength measurements or they did not collect PROMs pre-operatively to establish a baseline level of satisfaction.

COMMENT: The investigators were able to collect complete data on 23 of 41 patients. Were the ones who completed the study more or less inclined to do so? Nonetheless, this is an impressive series of patients who underwent toe(s)-to-hand transfer. Satisfaction was high, improvement in function and appearance was generally obtained, and donor site morbidity was nil.

Hand therapists often see patients with digital amputations before any reconstruction is performed. This paper will help guide conversations and improve expectations if toe-to-hand transfer is under consideration.

March, 2019: Update on Hand Transplantation

[Park SH et al: Hand Transplantation: Current Status and Immunologic Obstacles. Exp Clin Transplant 2019 Feb;17\(1\):97-104](#) [full text, free](#)

Coincidentally, this recently published article appeared almost simultaneously with a long and detailed investigative journalism report in [Wired Magazine](#). Even though very few of us have treated or have even seen a patient with a hand transplant, we should be conversant with the current state of affairs in order to respond intelligently when patients and other acquaintances ask our professional opinion.

Hand transplantation was first performed in 1964 in Ecuador. The graft was quickly rejected and required removal three weeks later. The next one was performed in 1998 in France, and subsequently 88 more cases worldwide have been reported. Currently there are at least 19 hand transplant centers, including one or more in Australia, Belgium, China, Iran, Mexico, Poland, Taiwan, Turkey, United Kingdom, and United States.

Although the surgical techniques of harvesting the limb from a cadaver and attaching the part to the recipient's amputation stump are demanding and time consuming, they pale in complexity to the immunological issues of preventing the host from rejecting the graft. Sometimes too, the graft (transplanted hand) tries to reject the recipient host.

Perhaps the most important recent shift in thinking has been from the concept of immunosuppression to one of immunoregulation—convincing the body to tolerate the graft with minimal pharmacologic persuasion.

Both acute and chronic rejection are problems, especially for grafts as complex as the upper extremity, which includes multiple tissues of varying antigenicity, particularly skin. Clinical signs of acute rejection include rash, edema, blisters, and ulcers. Because the skin is visible to the patient and to the treatment team, rejection episodes can be quickly identified and treated. Often topical treatment is all that is required.

Eighty-five percent of recipients have experienced at least one episode of acute rejection, and 56% have experienced multiple episodes.

Long term loss of graft function is related to the body's ongoing immunologic inclination to reject the graft. Predisposing factors include the timing and intensity of acute rejection episodes and their resistance to steroid treatment, older or unstable donors, atherosclerosis, prolonged cold ischemia, and recipients with hypertension, diabetes, obesity, hypercholesterolemia, and noncompliance with the anti-rejection medication regimen.

A triple-drug immunosuppressive treatment is commonly used. One of the drugs, tacrolimus, enhances nerve regeneration but accentuates kidney toxicity, hypertension, and diabetes.

An improved ability to perform activities of daily living is nearly universal among patients with viable transplants. Recovery of protective sensation is universal.

Early complications have included death, acute limb loss, vessel thrombosis, skin necrosis, pneumonia, and sepsis. Late complications have been mostly related to the immunosuppressive treatment and include opportunistic infections, diabetes, end-stage kidney disease, hypertension, avascular necrosis of the femoral heads, skin cancer, and hyperparathyroidism. In Europe and the US, six hands have required removal. In China, at least seven hands have been removed.

Comment: Dr. Park and colleagues paint a generally optimistic future for hand transplantation despite the monumental issues of cost, complications, and compliance. The ethics of committing a healthy person with a missing hand to lifelong risks of early death, kidney failure, and skin cancer remain questionable. The decision for a patient who is missing both hands is more nuanced. Before deciding whether you would undergo a hand transplant yourself, read the [Wired Magazine article](#) for further perspective.

April, 2019: Are there roles for passive prosthetic hands and tools?

[Maat B et al Passive prosthetic hands and tools: A literature review. Prosthet Orthot Int. 2018 Feb;42\(1\):66-74.](#)

Dutch investigators performed a literature review on passive prosthetic hands and tools. Using standard search strategies and literature databases, they found 38 articles for inclusion. Seventeen were based on user studies (n=2367), and three were based on author experience in fitting and evaluating prostheses (n=7847). The remaining articles were reviews, descriptions of specific prostheses, or evaluations of prosthetic appearance.

The authors first address the issue of terminology, which has been non-specific, overlapping, or both, and therefore confusing. They provide a new classification system by dividing the devices into either prosthetic hands or prosthetic tools, and then subdividing these groups into static and adjustable. Static prostheses have no moving parts. With an adjustable passive prosthesis, users can reposition the fingers or wrist with their sound hand or by pushing the prosthesis against a solid object. (An active prosthesis is actuated by an electric motor or by a body-powered cable.)

Across ten studies, one-third of subjects used a passive hand prosthesis. Conventional thought has been that recent amputees and children start with a passive device and then transition to an active prosthesis. On review, however, many older people and long-standing amputees use passive hand prostheses after having tried active devices. Motivation to use a passive hand prosthesis centers around appearance and comfort, and the device may mostly be used on social occasions for enhanced self-confidence and self-image.

Several studies note that there is a great overestimation of the physical disability of people with an upper limb amputation and that approximately 90% of activities of daily living can be performed using the sound hand, and the other 10% require only minimal extra effort. The authors speculate that the push for active prostheses might relate to an overestimation of physical impairment caused by a unilateral hand amputation and/or that people other than the

amputee have interests and expectations of their own, which might be a personal interest or a financial driver.

Future research on passive prosthetic hands should focus on improving comfort and reducing weight of passive hand prostheses such that the user can wear it comfortably, forget about it, and pass unnoticed.

Papers on passive prosthetic tools center on driving, sports, and musical instruments. Tools are commercially available for playing hockey, tennis, golf, and baseball and for bowling, fishing, skiing, paddling, shooting, weight lifting, and photography. Tools for holding a drumstick, violin bow, or guitar pick are also available. In many instances amputees may not know about the adaptive devices and unnecessarily give up their vocation or avocation. A steering wheel knob is the most frequent driving aide and can be used by the normal hand or by either a passive hand prosthesis or a tool. For tools to be maximally helpful, issues regarding further development include secure suspension, durability, suitable weight, and simplicity. Prosthetic tools are typically task specific, whereas a passive adjustable prosthetic hand can grasp a wide range of objects.

The authors recommend that future improvements not focus on functionality since passive prosthetic hands offer limited although adequate assistance for most activities of daily living. Rather research should focus on improved appearance, comfort, and control.

COMMENT: I found the paper enlightening. Those of us with two highly functional hands naturally hope/wish that everybody else has a working pair as well; but perhaps our good intentions are misguided in directing amputees toward active prostheses which can be rather complicated, cumbersome, and heavy. The authors suggest, having reviewed the available literature, that an amputee may not want an active prosthesis and would rather manage without a prosthesis at all or favor one that improves appearance more than function. Also, we should be aware of available passive prosthetic tools that can help amputees succeed at what are normally bimanual activities. [FREE FULL TEXT](#)

May, 2019: The Effect of Phonophoresis on Carpal Tunnel Syndrome

[Boonhong J, Thienkul W: Effectiveness of Phonophoresis Treatment in Carpal Tunnel Syndrome: A Randomized Double-blind, Controlled Trial. PM R. 2019 Apr 21. doi: 10.1002/pmrj.12171. \[Epub ahead of print\]](#)

Investigators in Thailand recently published the results of a randomized, double-blinded, prospective study investigating the effectiveness of phonophoresis with either steroid (dexamethasone) (PH-D), a non-steroidal (piroxicm [Feldene]) (PH-P), or ultrasound with just

gel placebo (US) on mild to moderate carpal tunnel syndrome. Outcome measures included the Boston Carpal Tunnel Questionnaires for both symptoms (BCTQ-S) and function (BCTQ-F) and electrophysiological distal sensory latency (DSL) and distal motor latency (DML).

The investigators divided thirty-three patients (50 hands) who had mild to moderate carpal tunnel syndrome into one of the three treatment groups. All affected hands received 10 ten-minute treatments over four weeks. The outcomes measures were applied before treatment and again at the end of treatment four weeks later.

RESULTS: All three groups showed significant improvements in the BCTQ-S and the BCTQ-F but there was no significant difference between treatment groups. The DSL was trending toward reduction in all three groups but the changes were not statistically significant. The DML decreased in the PH-D and the US groups but the difference was not statistically significant.

CONCLUSION: Ultrasound at the dose, duration, and frequency used reduced symptoms and improved function but phonophoresis with either steroid or non-steroid did not further enhance the results.

COMMENT: I love to see Level I studies: randomized, prospective, double-blinded—all beautiful words. At face value, this study would tend 1) to support the use of ultrasound for the treatment of mild to moderate carpal tunnel syndrome and 2) to refute the premise that phonophoresis with either dexamethasone or piroxicam enhanced the effect. Let's dissect the second part first.

There is no reason to suspect that phonophoresis would have a local effect, since despite wishful (and faulty) thinking, neither phonophoresis or iontophoresis has EVER been shown to have a local effect on CTS, tennis elbow, deQuervain tendinitis and other common maladies for which it is used. Why? Because if a drug gets through the epidermis, as soon as it is driven into the dermis and subcutaneous tissue, it is picked up in the capillary circulation and swept away. Thinking that the drug is going to bypass the capillaries and go directly into the target tissue is fanciful. Consider the analogy of shooting arrows at a target in a hurricane-force cross wind. There may be a faint effect of the drug on the target tissue as the drug circulates systemically, but the same can be accomplished with oral administration. Furthermore, the results of this study are tainted because 17 of the subjects had bilateral CTS. and both hands were randomized individually into one of the treatment groups. The authors did not breakdown results for the subjects with bilateral CTS. It is entirely conceivable that if one wrist received PH-D and the other received US and that both got better equally from the systemic distribution of the piroxicam.

Now, let's look at study result #1. Should we use ultrasound without any phonophoresis to treat CTS? Although the study implies that US is effective, there is more to the issue. To truly

conclude that US is effective, the study needs two more control groups: one where the US head is rubbed over the carpal canal with the US machine turned off and another group who has no treatment at all but reports to the clinic ten times over four weeks for the same conversation that the test subjects have with the investigators. This would answer the question of whether it is the US, the massage and attention, or merely the awareness of CTS and the expectation/hope that improvement is eminent. For instance, the paper makes no mention whether or not any of the patients were night splinted. I, for one, am going to make sure that my wrists are in neutral tonight before I go to sleep after having thought about this study.

The other problem I have with this study is the economics. The noted improvements required ten visits over four weeks. That is a huge financial and time commitment on the patient's part. Then the study gives no indication on how long the effect lasted after the end of treatment. If it was permanent or lasted at least a year, then maybe the commitment could be justified, but we just do not know.

After reading this paper, my paradigm for management of CTS is unchanged: brace and activity modification first, then cortisone injection if necessary, then surgical release if symptoms persist or recur. If readers want to repeat this study with two additional control groups and longer follow-up, I would love to review the results.

June 2019

Using a Touchscreen Tablet Application for Post-Carpal Tunnel Release Rehabilitation

[Blanquero J et al: Exercises using a touchscreen tablet application improved functional ability more than an exercise program prescribed on paper in people after surgical carpal tunnel release: a randomised trial. J Physiotherapy 2019; 65:81-87](#)

Investigators in Seville, Spain, recently published their results from a prospective, blinded, randomized trial testing the efficacy of a novel touchscreen tablet-based vs. a traditional paper handout-based home rehabilitation program following carpal tunnel release.

Fifty patients who had recently undergone open carpal tunnel release first answered the Quick DASH questionnaire for functional ability (primary outcome). Secondary outcome measures performed were grip strength, pain measured on a visual analog scale, and dexterity using the Nine-Hole Peg test. The subjects were then randomized into two groups. The control group received printed instructions for a hand rehabilitation program that consisted of active motions of all joints of the treated upper limb with focus on finger and wrist movements. They were instructed to complete the 25-minute program at least five times weekly for four weeks. The experimental group performed their home exercise program guided by the ReHand tablet application. The app indicates the desired movement of the wrist or fingers and monitors compliance when the patient touches the screen in response to the requested movement.

Investigators monitored compliance in the control group by making weekly phone calls and in the experimental group by electronic transfer of data from the tablet computer to a web management panel.

After four weeks of exercise, the outcomes measures were performed again but with the examiner blinded regarding which treatment the subject had performed.

RESULTS The experimental and control groups were well matched with respect to age and sex, and both groups had similar baseline scores on all of the outcome measures.

After four weeks of home rehabilitation, the experimental group had statistically significantly improved Quick DASH scores compared to the control group with a mean difference of 21 points (95% confidence interval 33 – 9). Although the mean changes for grip strength, pain, and peg test favored the experimental group, none of these differences reached statistical significance.

DISCUSSION The study showed that the innovative, touchscreen-based rehabilitation program improved self-reported functional ability compared to a traditional paper-based program. Because the app was inexpensive and safe, the authors concluded that at least when patients had access to their own tablet computer, that a mean improvement of 21 points in the Quick DASH score was clinically worthwhile, and an institution could conceivably loan a tablet to post-carpal tunnel release patients who did not have one.

The authors acknowledged that the noted significant improvement in functional ability could not clearly be attributed to diminished pain, increased strength, or improved dexterity; but since these secondary outcome measures trended to favoring the experimental over the control group, the improvement in functional ability was at least not at the expense of recovery on the three secondary outcomes.

The investigators also noted that by taking measurements only at the beginning and end of the rehabilitation program, the evolution of any benefits during the study or erosion thereafter remain unknown.

COMMENT This was a carefully planned and executed study, elegant in its simplicity. For the growing percentage of the population that has familiarity with and access to tablet computers, apps such as ReHand may well have increasing value for home programs for common hand and wrist conditions, including distal radius fractures. I see the interactive nature of the recommended exercises and the opportunity to monitor and encourage compliance as positive factors in engaging patients in their recovery process. Applications such as ReHand are not particularly expensive. Patient travel- and clinic-visit time are expensive. When the patient already has access to a tablet computer, I expect that from both quality and cost perspectives we will see more of such offerings. Is the idea getting you thinking? I hope so.

July 2019

A Novel Option for Thumb Reconstruction

[Li Y et al: Thumb amputations treated with osseointegrated percutaneous prostheses with up to 25 years of follow-up. JAAOS Glob Real estate Rev 2019; 3:e097](#)

Investigators from Stockholm, Sweden, recently published a long-term follow-up study on 13 patients with thumb amputations who underwent a two-stage reconstruction. First, they implant a metal receptacle into the bony remnant and anticipate bone ingrowth into the fixture. On an average of 3 months later, the skin on the end of the amputation stump is thinned to stimulate skin healing directly to the bone. Then an abutment screw is pressed through the skin into the fixture to provide an exposed metallic post to which a custom cosmetic prosthesis is attached. Implantation of a metallic implant into their bony remnant.

The investigators started using this procedure in 1990 using custom-designed experimental implants in three patients. Beginning in 2004, they have used a standardized implant in an additional 10 patients and now report on follow-up as long as 25 years (average 9.5 years). The researchers considered failure as removal of the fixture, and at regular follow-up appointments measured DASH scores, pinch and grip strengths, monofilament threshold sensory testing, and the Sollerman standardized hand function test.

Two patients died from unrelated causes during the course of the study. Four were non users. Two of these had their implants removed because of loosening, one had a deep infection which required hardware removal, and one patient decided not to use any prosthesis after a year. Five other patients have had seven superficial infections around the skin openings, and all were treated successfully with antibiotics and local wound care.

There were eight mechanical complications in the three original patients treated with the custom-designed implants before 2005. These included bending or breakage of the percutaneous post, and all were successfully treated with post replacement. No mechanical complications were noted for the patients who received the standardized implant beginning in 2005. For both types of implant, no failures have occurred after the first year, with the longest follow-up being 25 years.

For the seven patients who were available for functional testing, they used their prostheses every day for 8 – 24 hours. The average grip, tip pinch, and key pinch strengths were 70%, 66%, and 71% of the unaffected hand, respectively. The mean value of all scores from the Sollerman hand function test was 76 out of a possible 80 points. All patients were able to feel touch on their prostheses. One patient could detect the 2.83 (.08 gram) S-W monofilament, one could detect the 3.61 (.22 gram) monofilament, two had protective sensation, and three others could feel deep pressure.

DISCUSSION Function of the cosmetic prosthesis fixed to the thumb remnant through an osseointegrated fixture and percutaneous post parallels function following a toe-to-thumb transfer. All of the prosthetic users regained at least some sensibility, evidence for osseoperception, that has been observed previously in individuals receiving dental or extremity osseointegrated prostheses. The mechanism for this perception is uncertain. The sensibility present in the osseointegrated prostheses provides a distinct advantage over an ordinary hand prosthesis, where the user has no tactile feedback

and instead has to rely on visual clues. The procedures of fixture and post placement are markedly easier than toe-to-thumb transfer and do not incapacitate the foot. Infections can be problematic with the percutaneous post, but most have been managed successfully with preservation of the implants. Since the investigators implemented standard implant components and a strict rehabilitation program in 2005, they have had 100% success for the six patients with average follow-up of seven years (longest ten years).

COMMENT The concept of leaving a metallic implant sticking through the skin for years is counterintuitive. The investigators' success in recent cases stems from their experience in gaining osteointegration of the implant and stable, non-mobile skin surrounding the post. Clearly, this is not a commonly used method of thumb reconstruction but certainly has its merits in terms of simplicity compared to toe transfer and the restoration of at least some sensibility compared to standard prosthetic fitting. It is a procedure that all hand care specialists should be aware of when discussing reconstruction options with patients who are missing thumbs.

August, 2019:

Should we immobilize the wrist after flexor tendon repairs?

[Woythal L et al: Splints, with or without wrist immobilization, following surgical repair of flexor tendon lesions of the hand: A systematic review. Hand Surg Rehabil 2019 May 24. pii: S2468-1229\(19\)30073-8.](#)

Investigators in Denmark sought to answer this important question by performing a systematic analysis. They reviewed studies, all languages and no date restrictions, involving adults over age 18 who underwent surgical repair of flexor tendon lacerations in the hand. Their initial screen produced 2270 articles. After eliminating duplicated or irrelevant articles, 154 were left. The investigators read the full text of these articles, and unfortunately none of articles met their inclusion criteria because they were not randomized controlled trials or observational comparative studies or that the patients had undergone concomitant nerve repairs. Undaunted, the investigators summarized the three relevant studies that shed at least some light on their original research question.

1. A prospective study compared results in patients receiving the Modified Belfast protocol (early active motion with the wrist immobilized) to patients receiving a splint that allowed synergistic wrist motion. The second group achieved better functional outcomes, but the results were possibly biased because the second group received their therapy from a single clinical specialist whereas the wrist-immobilized group received their rehabilitation from a variety of therapists with different skill levels. Other issues with the study included a lack of description of injury severity, and issues of group allocation, motivation and compliance.

2. A retrospective study compared two types of splint treatment following repair of zone II flexor tendon injuries. One group wore a dorsal orthosis holding the wrist in neutral and blocking mp joint extension at 30 degrees. The other group used the Manchester short splint which allows 45 degrees of wrist extension, full wrist flexion, and all but 30 degrees of wrist extension. Total range of motion was not significantly different between the two groups after 3 months, but the Manchester short splint group had 22% excellent results compared to 6% for the traditionally splinted group. Selection bias is likely in that only patients deemed to be highly compliant were treated with the Manchester short splint.
3. One team repaired the tendons in such a way that they used no post-operative immobilization at all. Passive E/F exercises began the first day after surgery, and active mobilization began two days later. Eight out of 14 fingers in 13 patients achieved excellent outcomes. There were no tendon ruptures. The small cohort and no control group are study weaknesses.

COMMENT: Despite the authors' herculean effort to review over 2000 articles, their results are woefully and entirely inconclusive. The articles that they did summarize offer a glimpse of what a carefully designed and executed prospective, randomized trial might reveal regarding this important and commonly encountered problem. Certainly flexor tendon repair rehabilitation protocol has come a long way from initially not repairing in "no man's land" at all but rather performing a tendon graft later on. Then Kleinert and others greatly advanced our understanding by advocating early passive flexion and active extension. The more recent understanding that wrist extension combined with digital flexion and wrist flexion combined with digital extension allows for maximal gliding and minimal tension is an intriguing advance, we just do not yet know whether this less encumbering immobilization is truly effective.

[September-October 2019 Rehabbing Distal Radius Fractures with Light Therapy](#)

[Zlatkovic-Svenda MI et al: Complex Regional Pain Syndrome \(Sudeck Atrophy\) Prevention Possibility and Accelerated Recovery in Patients with Distal Radius at the Typical Site Fracture Using Polarized, Polychromatic Light Therapy. Photobiomodul Photomed Laser Surg. 2019 Apr;37\(4\):233-239](#)

Investigators from Serbia and Bosnia and Herzegovina recently reported on the effects of polychromatic (i.e., not laser, which is monochromatic) polarized light used during the

rehabilitation after distal radius fractures (DRF) in a prospective study of older women, average age 63.

Fifty-two patients were enrolled in the study and were randomly divided into two equal and age matched groups. Upon cast removal, both groups received daily treatment at home for 15 days that included non-steroidal anti-inflammatory drugs, exercises, and cryotherapy (ice) applied to the dorsum of the hand and wrist. One group also received polarized, polychromatic low-energy light radiation. All patients were evaluated at days 0, 7, and 15 with a pain visual analog scale (VAS) score, and measurements of forearm pronation and supination. Also measured were fist-forming capacity at 15 days and the presence or absence of CRPS-induced complications that occurred within the first 6 months.

Results

The VAS scores were not significantly different at days 0 and 7 and were marginally, yet statistically significantly, different at day 15, $p = .046$. Supination was significantly different at both days 7 and 15 in favor of the light-treated group, with an improvement of 9 degrees over the control group at 15 days. Pronation was not significantly different at either 7 or 15 days. Fist-forming capability was not statistically different between the groups. At 6-month follow-up, 15% of the control group had manifested signs of CRPS whereas none of the light-treated group had been so affected. This difference was statistically significant.

Discussion

The light source is a proprietary device, Bioptron (Wollerau, Switzerland); and polarized, polychromatic light requires no special training or protection as does low-level laser therapy. Polarized, polychromatic light is said to penetrate to different levels through the skin and change cell membrane permeability, stimulate mitochondria to increase availability of ATP, stimulate microcirculation through the production of nitric oxide, stimulate immune parameters, increase fibroblastic collagen production, and alter pain perception. The authors provide references to previous studies that support these claims. They also offer references to studies that report the successful use of polarized, polychromatic light in sports medicine, kidney failure, and for treatment of CRPS.

The authors conclude: "...low-energy, polarized, and polychromatic light therapy combined with conventional therapy ... in patients with DRF appears a better choice and treatment option for pain control improvement and a range of motion achievement; it also significantly reduces CRPS occurrence after DRF in gerontology."

Comment

Where to start? In a table, the authors enumerate the parameters of the light therapy device. It has wavelengths from 480 nanometers (blue) to 3400 nm (infrared), yet at least 95% polarization is only from 590 (orange) to 1550 nm (low infrared). So a broad spectrum of the emitted light is not polarized. They also list the power density, light intensity, and light energy per minute, but I have no frame of reference for comparison of any of these parameters. I would like to know how this device's parameters compare to an LED flashlight.

Although age-matched, the authors did not classify the fractures by pattern (intra-articular vs extra-articular) or degree of displacement. In other words, the groups may have been quite different without the investigators' knowledge.

The study was not blinded, and the treating therapist collected the measurements, both which introduce the possibility of bias. For unexplained reasons, the investigators did not measure wrist flexion and extension, only fist formation and forearm rotation.

Nor did they report forearm motion beyond the 15 days of therapy. It is unclear whether the 6-month follow-up seeking evidence of CRPS was by direct examination or by questionnaire or phone evaluation. In either case, the diagnosis of CRPS is arbitrary and likely differs from observer to observer.

As hard as it is for me to comprehend, light may have salutary tissue effects, it certainly does on melanin and vitamin D production in the skin. The farther beneath the skin the claims go, the more skeptical I become. This paper did nothing to reduce my skepticism.

November, 2019: The Effect of Kinesiotaping Fingers of Musicians with Dystonia

[Bravi, R et al: Assessment of the effects of Kinesiotaping on musical motor performance in musicians suffering from focal hand dystonia: a pilot study. Clin Rehabil. 2019 Oct;33\(10\):1636-1648.](#)

Investigators from Italy and Germany recently studied seven highly experienced (years playing 26 +/-10) male musicians (age 36 +/- 9) who had focal hand dystonia for an average of 9 +/- 10 years beginning at age 27 +/- 3 years. Four participants played keyboard instruments, and the others played either the violin, guitar, or clarinet.

Each musician, blinded to the purpose of the study, warmed up and then performed a proscribed musical exercise before and after Kinesiotaping with Correctional Kinesiotaping (CK) and Sham Kinesiotaping (SK). Neither the experts who evaluated the performances nor the

musicians knew whether the fingers had been taped for CK or SK. The musicians also self-reported their impressions after CK and SK, which were randomly applied. During the experiment the investigators also measured the electromyographic activity of the wrist antagonist muscles.

A neurologist specializing in movement disorders made the diagnosis of focal hand dystonia, defined as a painless loss of fine digital motor coordination occurring while playing a musical instrument. Loss of coordination consisted of the involuntary flexion of one or more fingers (dystonic fingers) or uncontrolled extension of adjacent digits (compensatory fingers).

Four professional musicians, two of whom were also health-care-professional experts in movement disorders, evaluated the subjects' performances with a standardized video rating procedure. The videoclips were randomized and paired, and the raters compared pairs according to "general performance" and "finger posture" and ranked them on a visual analog scale ranging from "strongly resembling natural posture" to "strongly deviating from natural posture."

Correctional Kinesiotaping was customized to each musician according to his specific dystonic pattern, either by normalizing uncontrolled flexion with application of the tape to the dorsum of the finger or by normalizing uncontrolled extension of a compensatory finger by applying tape to its volar surface.

Sham Kinesiotaping was performed on the same fingers to which the CK had been applied (or would be applied, according to the randomization). The same length of tape was applied, but it was split and applied medially and laterally and without stretching.

With video and EMG monitoring, each musician played a baseline exercise, had CK and SK in random order followed by playing the same passage, and then played again immediately after tape removal.

RESULTS: The experts noted no significant differences for either finger posture or general performance between CK and SK. Subtle differences noted during CK were lost after tape removal. The musicians felt that CK did not improve their performance, and the EMGs did not show any differences in coactivation of wrist flexors and extensors.

DISCUSSION: This was a pilot study; and with the negative results, the investigators noted that they were not planning to pursue this treatment possibility further. They acknowledge that the study group was small and heterogeneous regarding the musical instrument and the finger(s) involved and that there was no control group of unaffected musicians.

COMMENT: The investigators rigorously applied a creative and simple method to study a vexing problem. Their inventiveness, careful methodology, and willingness to publish negative results deserve emulation.

December 2019 Do positive health care experiences result in better outcomes?

[Schrier V et al: Better patient-reported experiences with health care are associated with improved clinical outcome after carpal tunnel release surgery. *Plastic and Reconstructive Surgery*, 2019; 143:1677-1686.](#)

[Tsehaie J et al: Positive experience with treatment is associated with better surgical outcome in trapeziometacarpal osteoarthritis. *Journal of Hand Surgery, European*, 2019, *J Hand Surg Eur Sep*;44\(7\):714-721.](#)

Patient-reported outcome measures (PROMs) such as the Disabilities of Arm, Shoulder, and Hand Questionnaire, the Michigan Hand Outcomes Questionnaire, and the Boston Carpal Tunnel Assessment Questionnaire are commonly used measures to assess procedural results from the patient's perspective. When used preoperatively and again postoperatively, PROMs indicate the patient's perspective on symptom relief and functional restoration, which may be different from the classically studied objective measures such as joint motion, two-point discrimination, and pinch strength.

New, at least as applied to hand conditions, are the use of patient-reported *experience* measures (PREMs), which assess patients' perspectives on the health care *process*. These factors include the quality of the hand care professionals' guidance before and after surgery, the level of listening and understanding, and the clinic's accessibility and cleanliness.

So the question arises, are PROMs and PREMs related? In other words, is a satisfactory experience the prelude to a good result?

Two recent studies, one on carpal tunnel release (CTR) and the other on trapeziometacarpal arthroplasty (TMA) for osteoarthritis, attempt to identify a relationship between experience and outcome. Both studies were prospective, took place in the Netherlands, and had some overlap of authors.

The CTR study involved 1607 patients, each of whom completed the Boston Carpal Tunnel Assessment Questionnaire before surgery and again three months after surgery when the patients also completed an experience questionnaire that included six subscales on different healthcare delivery aspects (eg physician communication and guidance, perioperative care, and hand therapist guidance and information before and after surgery).

The TMA study included 233 patients, all of whom received the same surgical procedure and who completed the Michigan Hand Outcomes Questionnaire before surgery and twelve months after surgery. Three months after surgery these patients also completed an experience survey that was nearly identical to the one used in the CTR study.

In both studies, the authors performed detailed statistical analyses and concluded that the differences noted between the pre- and post-op PROMs were correlated with the PREMS. Indeed, the patients with better experiences had better outcomes.

When the PREM results were divided into the six subscales, several trends emerged. Time spent with the healthcare provider proved to be less important than the quality of the conversation—quality trumped quantity. Treatment information, which removed uncertainty regarding expectations, also was strongly correlated with a better outcome.

In a way, the findings are intuitive. An anxious, isolated patient may develop catastrophic thinking. But before we all rush to add wine bars and BarcaLoungers to our waiting rooms in an effort to heighten our patients' experiences, an important caveat is in order. Both studies point out that although they found a correlation between PREMs and PROMs, neither study *proved* that better PREMs resulted in better PROMs. It might be that better PROMs resulted in better PREMs. In other words, a patient with a good final result could easily, in retrospect, recall the experience as being satisfying; whereas a patient enduring complications might remember every little inconvenience and uncertainty that occurred along the way. Or maybe the investigators found that PREMs and PROMs were correlated because both measures assessed the same underlying concepts--the type of patients who generally feel good may likely feel well-treated and are generally optimistic.

There are many weaknesses in both studies, including not measuring symptom severity or duration nor comorbidities such as diabetes or worker compensation status. Nonetheless, I found the papers interesting reading and food for thought. The placebo effect of a personal, trusting relationship likely contributes to greater treatment adherence and improved health, and we will likely see follow-on studies to explore in depth the relationship between outcomes and experiences. As classically stated, the success of healthcare providers relates to availability, affability, and capability, in that order.