

# Treatment of Osteoarthritis With Low-level Laser Therapy, Acupuncture, and Herbal Therapy: A Case Report

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## Abstract

Osteoarthritis is a challenging diagnosis to navigate and treat. Management options range from nonpharmacological agents to surgical repair. No specific combination of therapies has yet been identified for optimal management although a variety of therapeutic options have been studied. This case report details the

use of low-level laser therapy, acupuncture, and herbal medicine in a 64-year-old female with radiographically confirmed osteoarthritis. Near-complete resolution of her symptoms was associated with the multiple therapies outlined in this case report.

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Osteoarthritis is a chronic disease that is difficult to manage and is a major cause of disability in older patients.<sup>1</sup> Despite the prevalence of osteoarthritis, treatments that modify the disease process with beneficial outcomes are lacking. Management options for osteoarthritis are vast. The current standard of care for osteoarthritis involves first-line nonpharmacological interventions such as patient education, weight management, exercises, braces, foot orthoses, and use of assistive devices.<sup>2</sup> Use of medication is considered second-line therapy and includes oral and topical nonsteroidal anti-inflammatory drugs, topical capsaicin, duloxetine, and intraarticular glucocorticoids.<sup>3</sup> In some cases, surgical referral is necessary.<sup>2</sup> Although other therapies have been explored, there is no present consensus regarding an ideal management strategy for osteoarthritis. This case report involves the use of low-level laser therapy (LLLT), acupuncture, and herbal therapy to reduce pain and improve mobility in a 64-year-old female with radiographically confirmed osteoarthritis. This case report followed the CARE guidelines for case reports.<sup>4</sup>

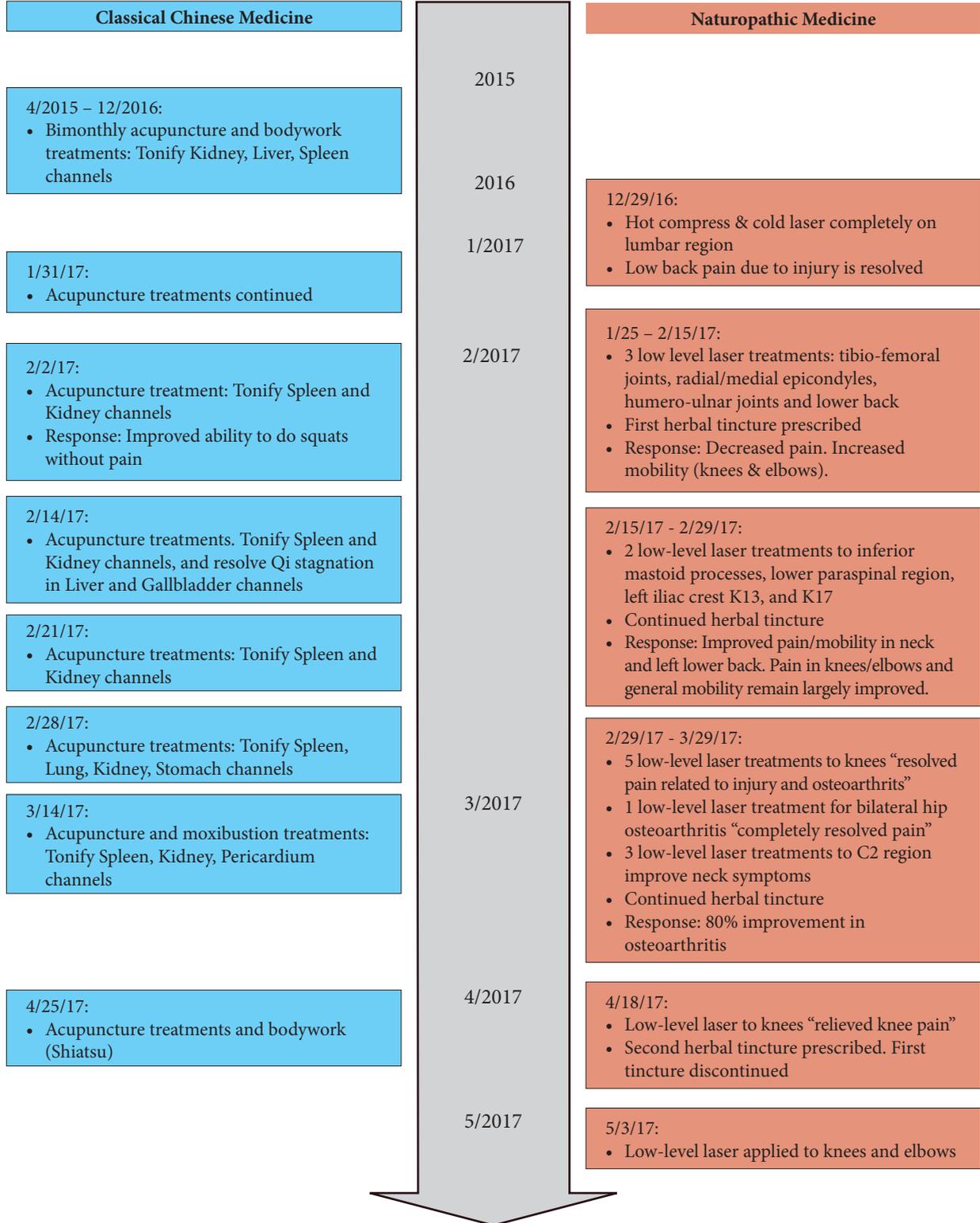
## Patient Case

In January 2017, a 64-year-old female presented to clinic with a longstanding, radiographically confirmed diagnosis of osteoarthritis in multiple joints. Arthritis in both knees was diagnosed in 2004, the cervical spine in 2007, and both wrists in 2014. She reported pain and limited range of motion in the aforementioned regions of her body. She was positive for several risk factors for osteoarthritis including her age, gender, slightly elevated body mass index, and a lifetime of physical exertion. Her family history was negative for osteoarthritis but positive for early fractures.

She attempted to manage her symptoms with a combination of supplements, lifestyle modifications, and hands-on therapies. She started with lifestyle changes such as exercising aerobically 3 to 5 times per week and eliminating wheat from her diet. She tried fish oil, glucosamine, methylsulfonylmethane, and 2 professionally prescribed homeopathic remedies for extended periods. Yet, none of these interventions seemed to produce any clear improvement of her symptoms. She also attempted the use of nonsteroidal anti-inflammatory drugs, topical arnica cream, and Chinese herbal liniments, which temporarily reduced her pain when it was severe. Two years after the onset of menopause, she was prescribed Bioest 50/50 (estriol 0.75 mg, estradiol 0.75 mg, dehydroepiandrosterone 3.0 mg, progesterone 112.5 mg, testosterone 1.5 mg). This dose was gradually decreased during the succeeding 10 years. A lapse on her prescription 10 years later, as well as the death of her husband, corresponded to aggravation of her joint pains.

**Timeline.**

**Chief Complaint:** 64-y-old female with persistent chronic arthritic joint pain.



**Outcome:** Patient reports 80% improvement in arthritic pain—laser intervention created the most improvement. Chinese medicine and herbal medicine were supportive. Patient continues all treatments as needed.

**Table 1.** Treatment Interventions

Date	Low-level Laser Therapy <sup>5-9</sup>	Acupuncture <sup>10-13</sup>	Herbal Therapy <sup>14-16</sup>
January 2017	Three treatments for knees and elbows.	Tonify spleen: SP-3, PC-7, KD-1, KD-3, LV-8, HT-9, HT-4  Tonify kidney: KD-7, LU-8, CV-12, LV-8, LV-4, LI-11, ST-44  Moxibustion: CV-12, CV-6	Equal parts of: - <i>R palmatum</i> - <i>S marianum</i> - <i>C scolymus</i> - <i>R crispus</i> - <i>P lactiflora</i> - <i>P kurroa</i> - 15 drops taken 3 times daily
February 2017	Two treatments for neck and left low back. Pain and mobility in knees, elbows, and neck largely improved.	Tonify kidney: KD-7, LU8, S-P3, TW-4, LI-5, LI9, LI7, TW-7  Clear liver qi stagnation: ST-36, LI-10, SP-6, KD-3, SI-14, LI-16, LI-13, UB-40  Moxibustion: GV-14, UB-23	Continue previous tincture
March 2017	Five treatments resolve arthritic pain and pain from bilateral knee injury (bilateral hip pain completely resolves after 1 treatment and neck pain/mobility improves after 3 treatments). Patient reports 80% overall improvement in arthritic symptoms.	Tonify spleen, kidney, and pericardium: SP-3, PC-7, KD-3, KD-7, KD-10, KD-27, GV-20  Moxibustion: SP-9 and ST-36	Continue previous tincture
April 2017	One treatment for mild-moderate recurrence of bilateral knee pain and stiffness.	Tonify spleen and kidney, warm the middle, enhance structural integration: KD-10, SP-9, GV-24, GV-20  Scalp zones: right arm and right shoulder  Bodywork: Shiatsu, Trager rocking technique	Equal parts of: - <i>S officinalis</i> - <i>W somnifera</i> - <i>B monnieri</i> - <i>R glutinosa</i> - <i>Polygonum</i> - <i>A julibrissin</i> - 10 drops manganese oligo, 15 to 30 drops taken 3 times daily

Two years prior to her initial presentation (April 2015), the patient's care also involved bimonthly acupuncture. The treatments included several Chinese medicine submodalities such as acupuncture, bodywork, and moxibustion. From the Chinese medicine perspective, osteoarthritis in this patient was linked to *Wind-bi* syndrome. For this case, treatment of *Wind-bi* syndrome generally emphasized support of the spleen, kidney, and liver organ systems with the aforementioned therapies. The specific treatment varied from session to session, as the patient's unique symptom picture and clinical signs differed at each clinic visit. Her overall response to these treatments was variable.

January 2017 marked the first of several LLLT treatments for her arthritic joint pain. The patient returned weekly during the succeeding 2 months to receive treatments consisting of two 30-second laser applications to each site. At that time, she also began taking 15 drops of a prescribed herbal tincture 3 times daily (Table 1). The LLLT specifically targeted the knee and elbow pain in the first 3 visits and was performed over the tibio-femoral joints, radial and medial epicondyles, humeroulnar joints, and LV-3 (an acupuncture point on the liver channel between the first and second metatarsals). At the next 2 visits, LLLT targeted the neck and lower-back pain and was performed on the inferior mastoid processes, lower paraspinal region, left iliac crest, KD-3, and KD-7 (acupuncture points on the kidney channel

posterior to the medial malleolus). For 5 consecutive visits following this, the LLLT targeting the knees, hips, and neck was performed on the regions medial and lateral to the patella, the femoro-acetabular joint, and the cervical region around C2. In April 2017, she was prescribed a new herbal tincture designed to correct a hypothalamic-pituitary-adrenal axis dysregulation that was likely associated with her osteoarthritic symptoms (Table 1).

In the course of 2 months, the patient reported major improvements in both pain and range of motion in all of her joints, and she stated that the "pain-relieving effects of cold laser occurred instantly." She remarked at a follow-up visit on May 3, 2017, that her joint condition had mildly relapsed due to lack of follow up but that her pain was still better than the time prior to initiating LLLT. Overall, the patient reported a pain severity rating of 9/10 (10 being the most severe) prior to LLLT and a 3/10 pain level after her treatments.

## Discussion

The pathogenesis of osteoarthritis is complex and not fully understood. Biomechanical factors, proinflammatory mediators, protease activity, nociceptor hypersensitivity, circulatory changes, dysfunction of mitochondria resulting from oxidative stress, diminished autophagy, and neuroimmune-endocrine activity all play a role in the development of osteoarthritis (Table 2). Although

destruction of articular cartilage is a key element, all joint tissues are affected in some way. Damage to the synovium, menisci, ligaments, bone, and articular cartilage results in pain and altered joint function. Injury to meniscus, ligamentous, or cartilaginous tissues, among other biomechanical factors such as obesity, create a predisposition to its development. Together, all of these processes cause changes in joint mechanics, sclerosis of subchondral bone, formation of osteophytes, and destruction of joint tissues, which stimulate release of more inflammatory mediators and perpetuate a vicious cycle.<sup>1</sup>

This patient discussed in this case report tried multiple therapies for her chronic osteoarthritis, including nonsteroidal anti-inflammatory medication, supplements, acupuncture, herbal therapy, and LLLT. Overall, the patient reported that she received the most improvement from LLLT. This case report contributes to the body of knowledge needed to more adequately evaluate the utility of LLLT, acupuncture, and herbal therapy for symptom management in patients with osteoarthritis, such that a definitive clinical recommendation can ultimately be established. This patient experienced fairly rapid improvements in her pain. The beneficial changes may have been due to mechanisms such as alteration of the inflammatory process, increased circulation to affected tissues, and decreased sensitization of nociceptor function. Other possible contributing mechanisms include stimulation of the electron transport chain in mitochondria, collagen synthesis, reduction of cortisol, and the placebo effect (Table 2).

The specific laser model used in this case report was the ML830 laser made by Microlight Corporation of America (Missouri City, TX, USA).<sup>17</sup> This laser uses a near-infrared wavelength of 830 nm at 90 mW. For comparison, the power output of a common incandescent light bulb is about 60 W. Preliminary research suggests that LLLT may have several mechanisms of action that affect osteoarthritis, summarized in Table 2. Class III “low energy” lasers do produce a photochemical rather than thermal response in human tissue—hence the term *cold laser*.<sup>18</sup> LLLT is used clinically for pain control and tissue healing.

LLLT can also be used to treat certain conditions by its direct application to acupuncture points. One study demonstrated the effectiveness of LLLT applied to acupuncture points for the treatment of osteoarthritic knee pain.<sup>12</sup> Research on LLLT suggests it as a cost-effective, therapeutic intervention for osteoarthritis, improving pain, general function, and quality of life in patients whose knees and neck are affected.<sup>5</sup> In some of these studies, LLLT was combined with regular physical therapy, highlighting the potential importance of comprehensive and holistic patient care that is some case may reduce the need for joint replacement.<sup>6-9</sup> This patient’s course of treatment included LLLT to several acupuncture points.

The patient in this case had bimonthly acupuncture sessions for 2 years. There is significant research supporting

the treatment of osteoarthritis with acupuncture. A meta-analysis of approximately 18000 patient cases demonstrated that acupuncture was significantly more effective than placebo for the treatment of chronic pain, suggesting that acupuncture is an effective treatment for chronic pain and a reasonable referral option.<sup>10</sup> The College of Rheumatology recommends considering the use of acupuncture as an adjunctive therapy for pain relief in patients suffering from knee osteoarthritis.<sup>11</sup> The long-term benefits of acupuncture in chronic pain syndromes like osteoarthritis have lasted for up to 12 months posttreatment.<sup>12</sup> One mechanism may regard its influence on inflammation by decreasing inflammatory cytokines and regulating the  $T_h1/T_h2$  cell response (Table 2).<sup>19</sup> Given the research evidence supporting the efficacy of acupuncture for the management of osteoarthritic pain, it is reasonable to conclude that this therapy contributed to the improvement in this patient.

This patient was prescribed 2 separate, complex herbal formulas associated with the treatment of osteoarthritis (Table 2). The first formula addressed the relationship between osteoarthritis and inflammation.<sup>14</sup> The second formula aimed to regulate the neuroimmune-endocrine axis and cortisol levels in osteoarthritis.<sup>20</sup> The herbal extracts in the formula are believed to decrease cortisol levels by enhancing adaptogenic potential.<sup>16</sup>

There are several limitations to this case report. Multiple interventions in a complicated patient makes it difficult to determine the role of a specific intervention and its applicability to other osteoarthritis patients. It is difficult to measure the role of lifestyle factors in the outcome of this case. Although we have documented the use of a specific combination of acupuncture, herbal therapy, and LLLT that appeared beneficial in the management of this patient, it is challenging to differentiate the specific effects of each intervention. Finally, although research has evidenced the benefits of acupuncture and LLLT in the treatment of osteoarthritic pain and limited range of motion, the quality and consistency of many of these studies are variable.<sup>29,30</sup> These challenges, and the integration of clinical expertise with external evidence limit the reproducibility of these treatments in other patients with osteoarthritis. There is a need for more case reports and clinical research to refine our understanding of the efficacy and interactions of these modalities in treating osteoarthritic pain.

## Conclusion

In this case, LLLT, acupuncture and herbal medicine all contributed to the management of this patient’s pain and limited range of motion. Near-complete resolution of her symptoms was associated with the regular treatment with this multimodal approach. Although the patient reported that she received the most benefit from LLLT, acupuncture and herbal medicine also appeared to contribute to her improvement. Additional studies would

**Table 2.** Pathomechanisms of Osteoarthritis and Corresponding Therapeutic Mechanisms/Actions

<b>Pathomechanism of Osteoarthritis</b>	<b>Low-level Laser Therapy: Corresponding Therapeutic Mechanism</b>
Increased in inflammatory cytokines, macrophages, and lymphocytes within affected joint tissue. <sup>1</sup>	Decrease in inflammatory cells (particularly lymphocytes) and inflammatory markers. <sup>20-22</sup>
Autophagy is compromised both in chondrocytes afflicted by osteoarthritis and in aging, leaving joint tissue more vulnerable to inflammation. <sup>24</sup>	Decrease in inflammatory cells (particularly lymphocytes) and inflammatory markers. <sup>21-23</sup>
Inflammatory cytokines within the joint's biochemical milieu hypersensitize nociceptors in joint tissues. <sup>25</sup>	Decrease in nociceptor hypersensitivity. <sup>26</sup>
Excess oxidative stress in chondrocytes causes mitochondrial dysfunction and decreased adenosine triphosphate production. <sup>24</sup>	Stimulation of the electron transport chain in mitochondria. <sup>18</sup>
Decreased blood circulation to subchondral bone. <sup>25</sup>	Increase in blood circulation. <sup>27</sup>
Type 2 collagen is degraded by collagenases (the most abundant collagen in cartilage, providing it with most of its tensile strength). <sup>1</sup>	Increase in collagen synthesis and myofibroblasts. Decrease in collagenase activity. <sup>21,28</sup>
<b>Pathological Mechanism Associated With Osteoarthritis</b>	<b>Herbal Medicine: Corresponding Therapeutic Actions</b>
Cortisol levels are increased, reflecting neuroimmune-endocrine axis dysregulation. <sup>20</sup>	Decrease in cortisol levels. <sup>16</sup>
Increased inflammatory cytokines and cells. <sup>1</sup>	Decrease in lipoxygenase and prostaglandin synthase activity. <sup>14,15</sup>
<b>Pathological Mechanism Associated With Osteoarthritis</b>	<b>Acupuncture: Corresponding Therapeutic Actions</b>
Increased inflammatory cytokines and cells. <sup>1</sup>	Decrease in inflammatory cytokines and regulation of T <sub>H</sub> 1/T <sub>H</sub> 2 cell response. <sup>19</sup>

be a valuable contribution in the development of management strategy for osteoarthritis that integrated these therapies.

### Patient Perspective

“In January 2017, the arthritis in my knees and hips had progressed to the point that I could no longer negotiate stairs in a normal fashion. I couldn't lift my knees, so I called the university clinic for an emergency appointment. The doctors suggested I try cold laser for my back pain; I was willing to try anything and the cold laser was appealing since it was painless. When I left the clinic that day, my pain was 80% improved and I was feeling amazed. One treatment was all it took to know whether cold laser might be effective for my arthritis pain. I began having treatments weekly and in 2 months I could climb stairs and soon I could bound up the stairs. My arthritis had been progressing as I age. The joints which were affected first and have hurt the longest require continual treatments to remain pain free. But those joints which were more recently painful, such as my elbows, responded with a few treatments.”

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### Author Disclosure Statement

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