Extracorporeal Shock Wave Therapy (ESWT) for Musculoskeletal Conditions and Soft Tissue Wounds (for Kansas Only)

Policy Number: CS041KS.01
Effective Date: June 1, 2025

➲ Instructions for Use

Table of Contents **Page**

Related Policies
None

Application

This Medical Policy only applies to the state of Kansas.

Coverage Rationale

For medical necessity clinical coverage criteria for extracorporeal shock wave therapy (ESWT), high energy, for plantar fasciitis, refer to the InterQual® CP: Procedures, Plantar Fasciitis, Extracorporeal Shock Wave Therapy (ESWT).

Click here to view the InterQual® criteria.

Extracorporeal shock wave therapy (ESWT), whether low energy, high energy, or radial wave, is unproven and not medically necessary in all other musculoskeletal or soft tissue indications due to insufficient evidence of efficacy.

Note: This policy does not address extracorporeal shock wave lithotripsy (ESWL) used for the treatment of:
- Gallstones
- Kidney stones
- Pancreatic stones
- Salivary stones

Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by federal, state, or contractual requirements and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Guidelines may apply.

CPT Code	Description
0101T	Extracorporeal shock wave involving musculoskeletal system, not otherwise specified
0102T	Extracorporeal shock wave performed by a physician, requiring anesthesia other than local, and involving the lateral humeral epicondyle
0512T	Extracorporeal shock wave for integumentary wound healing, including topical application and dressing care; initial wound
0513T	Extracorporeal shock wave for integumentary wound healing, including topical application and dressing care; each additional wound (List separately in addition to code for primary procedure)
0864T	Low-intensity extracorporeal shock wave therapy involving corpus cavernosum, low energy
28890	Extracorporeal shock wave, high energy, performed by a physician or other qualified health care professional, requiring anesthesia other than local, including ultrasound guidance, involving the plantar fascia

Description of Services

Extracorporeal shock wave therapy (ESWT) devices are similar to the lithotripters used for breaking up kidney stones in urology. They produce low- or high-energy pulses arising from acoustic energy, called shock waves, which can be focused and then propagated through water within body tissues. When focused on a boundary between tissues of differing densities, the shock wave is altered, and energy is emitted. The shock waves for orthopedic indications are the same as those used to break up kidney stones, but have ten times less energy. Low energy defocused ESWT or soft focused acoustical wave pattern is used for wound healing.

Although the mechanism of therapeutic effect for ESWT has not been established, it has been proposed that shock waves may have a direct mechanical effect through the rapid buildup of positive pressure and/or a more indirect effect through the implosion of bubbles in the interstitial fluid. These forces may reduce transmission of pain signals from sensory nerves, cause calcium deposits to disintegrate, break down scar tissue, cause a transient inflammatory response, and/or stimulate tissue healing (Hayes 2022).

Clinical Evidence

Achilles Tendonitis

Conclusive evidence recommending ESWT as a treatment for Achilles tendinopathy is lacking. Studies comparing high energy, single-treatment protocols with low energy, multiple-treatment protocols, and studies comparing various dosing intervals and energy flux densities are also needed to determine optimal treatment parameters. A standardized method to evaluate results may also be helpful. Published articles on ESWT for Achilles tendonitis have been limited to studies using animal models. There are no adequate prospective clinical studies demonstrating the effectiveness of ESWT for Achilles tendonitis.

Stania et al. (2023) conducted a systematic review and meta-analysis to determine the efficacy of ESWT as a monotherapy for Achilles tendinopathy. There were 373 articles identified from various countries, only six RCTs remained after inclusion criteria were met. The sample size was 157 participants in the experimental group and 187 participants in the control group. The results demonstrated the very low -quality evidence suggested that ESWT was no more effective in decreasing pain than any other conservative treatment (D: −0.8; 95% CI: −3.15, 1.56; $p > .5$). However, the heterogeneity of the studies included was high and no significant differences were found between the ESWT and control groups pooled scores. The authors concluded that despite high or medium methodological quality of the analyzed RCTs, an evidence rating was too low to allow conclusions. Therefore, no strong recommendations can be made for the use of ESWT in patients with Achilles tendinopathy. The limitations of the study include small sample size, short-term follow-up and low-quality evidence.

Feeney (2022) conducted a systematic review to evaluate the use of ESWT in the management of midportion Achilles tendinopathy. A search of databases [MEDLINE (PubMed), AMED, EMBASE, CINAHL, and CENTRAL] was performed with a total of 283 articles identified. Of these, seven randomized controlled trials (RCTs) were eligible for inclusion in the review. The mean sample size of the included studies was 57. Five studies diagnosed midportion Achilles tendinopathy based on history and physical examination while two confirmed the presence of Achilles tendinopathy by combining history and physical examination with ultrasound findings. Three studies utilized radial ESWT only, one study used a combination of radial and focused ESWT, one study compared radial and focused ESWT, and two studies used focused ESWT only. The length of follow-up ranged from three to 16 months. Overall, four of the seven RCTs included found a statistically significant improvement in outcome measures with the use of ESWT compared to control. The other three studies observed no statistically significant improvement in outcome measures with the use of ESWT compared to control, each did observe a significant improvement in the ESWT groups from baseline. The author concluded ESWT appeared to be safe and at least as effective as control in the management of Achilles tendinopathy. Additionally, the most effective intervention may be a combination of eccentric loading exercises with a course of ESWT. The author suggests that further high-quality studies with larger sample sizes and a combination of treatments are needed to determine the most effective treatment, dose, time between treatments, and frequency (Hz) of ESWT patients should receive.

In 2019, Stania et al. published results from a systematic review of research reports on ESWT in patients with Achilles tendinopathy to help practicing physiotherapists establish the most effective intervention parameters. A search was conducted using the following databases: PubMed, Scopus, EBSCOhost, and Web of Science. The papers were checked for relevant content and were included based on the following criteria: full-text article published in English and including comprehensive description of shock wave application. Twenty-two articles met the inclusion criteria. Most studies on the effectiveness of ESWT for Achilles tendinopathy included in this review were RCTs. Two case-control studies, a case series study, prospective audit, clinical trial protocol, and a pilot study were also considered. The majority were prospective studies. Only a few authors presented the findings from retrospective observations. The two modalities of shock wave therapy used for Achilles tendinopathy are focused shock waves and radial shock waves. The authors concluded that the complexity of the biological response to shock waves, the high diversity of application methodologies, and the lack of objective measurements all prevent ESWT effectiveness for Achilles tendinopathy from being fully determined. There are knowledge gaps yet to be researched, and the results of experimental studies remain contradictory. The authors noted that there is a need for further multidirectional and multicenter, randomized controlled studies on the effectiveness of shock waves for Achilles tendinopathy that should fulfil the criteria for evidence-based medicine.

In 2017, the Washington State Health Care Authority conducted a Health Technology Assessment to review the evidence for the efficacy of ESWT for treating Achilles tendinopathy. Two small RCTs showed significant pain improvement while running or playing sports, but there was no difference between groups while working or using the stairs. One RCT reported significant improvement in function when comparing ESWT to sham. The strength of evidence for this indication was low and there was no evidence found on the intermediate or long-term outcomes.

Guidance from the National Institute for Health and Care Excellence (NICE) concluded that although the evidence on ESWT for refractory Achilles tendinopathy raises no major safety concerns, evidence on efficacy of the procedure is inconsistent. NICE encourages further research into ESWT for Achilles tendinopathy, which may include comparative data collection. Studies should clearly describe patient selection, treatment protocols, use of local anesthesia and the type and duration of energy applied. Studies should include validated outcome measures and have a minimum of one year of follow-up (NICE, 2016).

Calcific Tendonitis of the Shoulder (Rotator Cuff)

Review of the recent clinical evidence suggests that, based on conflicting findings, high-energy ESWT is promising but not yet proven for improving pain and shoulder function in clinically significant ways for some patients with chronic calcific shoulder tendinitis; additional standardization of energy levels and treatment protocols are needed as well as additional data to address safety concerns and assess in which patient population benefits outweigh harm.

Xue et al. (2024) conducted a systematic review and meta-analysis on the effects of extracorporeal shock wave therapy (ESWT) for rotator cuff tendinopathy. A total of seventeen studies (n = 1,131) from 2006-2023, were included in the review. The results showed that compared with the control group, ESWT for pain, function, range of movement (ROM) and external rotation were statistically significant, with a total effective rate (TER) (OR = 3.64, 95% CI 1.85, 7.14, p = 0.0002). However, ROM-Abduction (SMD = 0.72, 95% CI -0.22, 1.66, p = 0.13) was not statistically significant. The authors concluded ESWT may be a promising approach for the treatment of rotator cuff tendinopathy. Due to the limited quality and number of included trials, additional high-quality prospective clinical studies are needed to verify these conclusions. Limitations of the study include lack of random allocation and concealment methods leading to selection bias, and language limitations.

A Hayes Health Technology Assessment (2022, updated August 2023) evaluated the efficacy of ESWT for treating symptomatic calcific tendinitis of the shoulder when conservative therapies have failed. Twelve RCTs were included in the assessment. ESWT was associated with improvement in function from baseline and reduction of pain in some patients with calcific tendinitis of the shoulder. Evidence comparing ESWT with clinical alternatives yielded conflicting findings or was limited in quantity. Primary complications were pain or discomfort during or just after treatment, bruising, and swelling. Hayes noted the overall quality of evidence was low and while ESWT appears to be safe and effective, continued research is needed to determine optimal ESWT treatment parameters, clarify comparative benefit versus alternative treatments, and establish treatment durability. Follow-up beyond twelve months was also recommended. According to the NICE guidance on the use of ESWT for calcific tendonitis of the shoulder, current evidence shows no major safety concerns in the short-term. However, evidence on efficacy is noted as inadequate. NICE recommends that ESWT for calcific tendinopathy in the shoulder should only be used in the context of research and further research should include RCTs comparing the procedure with current best practice (NICE, 2022).

Shao et al. (2022) conducted a RCT to investigate the effect of ESWT on short-term functional and structural outcomes after rotator cuff repair. Two groups randomized to either the ESWT group (n = 19) or the control group (n = 19) participated in five weeks of advanced rehabilitation three months after rotator cuff repair. The ESWT group also received 2,000 pulses of shockwave therapy once a week for five weeks. All individuals had clinical and magnetic resonance imaging (MRI) examinations at three months (baseline) and at six months (follow-up) after surgery. Thirty-two participants completed all assessments. Pain and function improved in both groups. At six months post repair, pain intensity was lower and American Shoulder and Elbow Surgeons form scores were higher in the ESWT group than in the control group (all p-values < 0.01). Signal/noise quotient near the suture anchor site decreased significantly from baseline to follow-up in the ESWT group (p = 0.008) and was significantly lower than that in the control group (p = 0.036). Muscle atrophy and the fatty infiltration index did not differ between groups. The authors concluded radial ESWT reduced early shoulder pain and accelerated proximal supraspinatus tendon healing at the suture anchor site post rotator cuff repair. However, the authors note that in terms of functional outcomes at the short-term follow-up, radial ESWT does not appear to be superior to advanced rehabilitation. Limitations include small sample size, short follow-up period, and the study only included individuals with medium to large rotator cuff tears. The authors suggest further studies are needed to evaluate the correlation between energy flux density and biological effects.

Surace et al. (2020) reviewed thirty-two RCTs and controlled clinical trials involving 2,281 participants with rotator cuff disease with or without calcific deposits. The primary comparison was shock wave therapy compared to placebo with a 3 month follow-up. The findings favored ESWT vs. placebo for pain levels [standardized mean difference (MD) -0.49, 95% CI –0.88 to –0.11] and functional status (standardized MD 0.62, 95% CI 0.13 to 1.11). The adverse events were more frequent with ESWT than placebo (relative risk 3.61, 95% CI 2.00 to 6.52). The authors concluded there were very few clinically important benefits of ESWT and uncertainty regarding its safety based on the currently available low- to moderate-certainty evidence.

Testa et al. (2020) completed a systematic review of two electronic medical databases searching for studies on the use of ESWT therapy without surgical treatment with symptoms duration more than two months, and at least six months of follow-up for treating rotator cuff tendinopathy, subacromial impingement, and medial and lateral epicondylitis (LE). After screening 822 articles that met the initial criteria, 26 articles were selected that met their criteria after a full-text review. The authors concluded that ESWT is a safe and effective treatment of soft tissue diseases of the upper limbs. Even in the minority cases when unsatisfied results were recorded, high energy shockwaves were nevertheless suggested in prevision of surgical treatment. The authors, however, reported a moderate overall risk of bias that could have influenced their analysis.

Bannuru et al. (2014) conducted a systematic review (n = 28 RCTs/1,307 subjects) of the evidence to assess the efficacy of ESWT in patients with calcific and non-calcific tendinitis. The outcome measures included pain, function and calcification resolution which was evaluated only in calcific tendinitis trials. High-energy ESWT was found to be statistically significantly better than placebo for both pain and function. The results for low-energy ESWT favored ESWT for function, while results for pain were inconclusive. The reduction in calcification was significantly greater after high-energy ESWT than after placebo treatment; results for low-energy ESWT were inconclusive. No significant benefit was found between ESWT and placebo for non-calcific tendinitis. The authors concluded that high-energy ESWT is effective for improving pain and shoulder function in chronic calcific shoulder tendinitis and can result in complete resolution of calcifications.

Verstraelen et al. (2014) conducted a systematic review and meta-analysis of RCTs across five electronic online databases to identify all RCTs that compared high-energy ESWT (> 0.28 mJ/mm^2) with low-energy ESWT (< 0.09 mJ/mm^2) in treating patients with calcifying rotator cuff tendinitis. The literature search originally identified 194 potentially relevant studies; 189 of which were screened out as they did not meet the criteria for the analysis. The total study population from five RCTs of low-versus high-energy ESWT consisted of 359 participants. All five RCTs showed greater improvement in functional outcome (Constant-Murley score) in patients treated with high-energy ESWT compared with patients treated with low-energy ESWT at three and six months. The three-month MD was 9.88 (95% CI, 9.04-10.72, p < 0.001; 6-month data could not be pooled). Furthermore, high-energy ESWT more often resulted in complete resorption of the deposits at three months. The corresponding odds ratio was 3.40 (95% CI, 1.35-8.58) and p = 0.009 (6-month data could not be pooled). Based on the meta-analysis, the authors concluded that high-energy ESWT is more effective than low-energy ESWT in terms of functional outcome (Constant-Murley score) and radiographic resorption (chance of complete resorption) of the deposits after three months. However, there is still a need for high-quality RCTs to discover the exact dose-response relation. In the authors' opinion, this future research should focus on high-energy ESWT because current available evidence indicates that high-energy ESWT is more effective than low-energy ESWT regarding the functional and radiologic outcomes in the short term and midterm.

Clinical Practice Guidelines

Canadian Agency for Drugs and Technologies in Health (CADTH)

A 2016 report issued by the CADTH reviewed evidence on the effectiveness of shockwave therapy for pain associated with upper extremity orthopedic disorders including rotator cuff tendinopathy and epicondylitis. Evidence from four systematic reviews suggests that, in comparison with placebo, shockwave therapy using high energy is effective in reducing pain in calcific tendinitis of the shoulder. Evidence suggests that that there is no significant benefit with ESWT compared to placebo or other treatments in case of non-calcific tendinitis of the shoulder. It should be noted however, that there is considerable overlap in the studies included in the four systematic reviews, hence findings are not mutually exclusive.

The authors noted it appears that, in general, the techniques for using SWT for all orthopedic disorders still need to be standardized. There appears to be a lack of consensus regarding the definitions for high and low energy SWT. Other issues include determination of precise doses and optimal frequency of application, whether the shockwaves should be directed to the target area by radiological or ultrasound imaging, and whether local anesthetic injections should be used in the target area prior treatment to reduce pain (CADTH, 2016).

Delayed or Nonunion Fractures

Conclusive evidence recommending ESWT as an effective treatment for delayed or nonunion fractures is lacking.

The Cochrane Library published a systematic review and meta-analysis conducted by Searle et al. (2023) to assess the effects of low-intensity ultrasound (LIPUS), high-intensity focused ultrasound (HIFUS) and ESWT as part of the treatment of acute fractures in adults. The review included twenty-one studies (n = 1,543 fractures) in 1,517 participants, no studies tested HIFUS. The results showed very low-certainty evidence for the effect of LIPUS on HRQoL at up to one year after surgery for lower limb fractures [MD 0.06, 95% confidence interval (CI) -3.85 to 3.97, favors LIPUS; 3 studies, 393 participants]. There was no difference in time to return to work after people had complete fractures of the upper and lower limbs (MD 1.96 days, 95% CI -2.13 to 6.04, favors control; 2 studies, 370 participants; low-certainty evidence). There is little or no difference in delayed union or non-union up to twelve months after surgery (RR 1.25, 95% CI 0.50 to 3.09, favors control; 7 studies, 746 participants; moderate-certainty evidence) nor any difference of skin irritation between groups. There was uncertainty whether ESWT reduces pain at twelve months after surgery in fractures of the lower limb (MD -0.62, 95% CI -0.97 to -0.27, favors ESWT); the difference between pain scores was not clinically important and evidence was low. The effect of ESWT on delayed or non-union at twelve months was low certainty of evidence (RR 0.56, 95% CI 0.15 to 2.01; 1 study, 57 participants). There were no treatment-related adverse events for ESWT. Data was not reported for HRQoL, functional recovery, time to return to normal activities, or time to fracture union. The authors concluded the effectiveness of ultrasound and shock wave therapy for acute fractures in terms of patient-reported outcomes was uncertain. Future studies of high quality evidence are needed. The limitations of the study include high risk of bias, small sample sizes, and inconsistencies in study findings.

A systematic review was completed by Kwok et al. (2022) to evaluate the use of ESWT in the treatment of foot and ankle fracture non-unions. Four databases were searched to identify relevant studies in the available literature. Eight studies were reviewed, demonstrating union rates of 65%-100% and 90-100% at three- and six-months following ESWT treatment, respectively. No major complications were seen in any of the studies. Minor complications included local soft tissue swelling, petechiae, bruising and pain. The authors concluded that the literature that is currently available is limited to case series of relatively small sample sizes, highlighting the need for a prospective, RCT to further investigate the efficacy of ESWT in the treatment of foot and ankle fracture non-unions.

In a systematic review by Willems et al. (2019) evaluating ESWT for treatment of delayed or non-union fractures, the authors found that high quality RCTs are still needed to validate the efficacy and safety of this treatment. The review included 30 peer reviewed studies consisting of two RCTs and 28 prospective and retrospective cohort studies involving a total of 2,027 delayed-unions and nonunions in adults. Delayed-unions treated with ESWT had a union rate of 86% (n = 314) while nonunions treated with ESWT had a 73% (n = 1,782) overall union rate. The overall union rate of nonunions treated with surgery was 81% (n = 80). Although the results showed similar union rates between ESWT and surgery-treated patients, none of the ESWT group had adverse events that required further care while there were severe adverse events noted in the surgery group. The authors found a lot of heterogeneity within and between the studies such as fractures of different bones, the use of different energy settings, number of treatments and number of shock waves applied with the ESWT and a lack of consensus as to when the biological endpoint is reached in which no further bone healing occurs. The authors concluded that high quality RCTs should be conducted on the effect of ESWT with homogeneous groups and shock wave parameters so that treatment recommendations can be made.

Elster, et al. (2010) conducted a study with 192 patients were treated with ESWT at a single referral trauma center for treatment for tibia nonunion. Nonunion was determined by radiographic or CT analysis at least six months following operative or nonoperative treatment, with at least three months of no radiographic changes. Fracture healing was determined by radiographic or CT analysis. At the time of last follow up, 138 of 172 (80.2%) patients demonstrated complete fracture healing. Mean time from first shock wave therapy to complete healing of the tibia nonunion was 4.8 months. Associated factors influencing fracture healing included number of orthopedic operations, shock wave treatments and pulses delivered. Patients requiring multiple (more than one) shock wave treatments versus a single treatment had a significantly lower likelihood of fracture healing. This study concludes that high energy ESWT may be used successfully in the treatment of tibia nonunions. The reported healing rate of 80% and the large sample size gives this study relevance; however, limitations include retrospective design and lack of a control group using immobilization alone. Although this study evaluated nonunion of tibia fractures, there is potential for future investigation of ESWT in the treatment of fracture and arthrodesis nonunion in the foot and ankle.

Zelle et al. (2010) conducted a systematic review to evaluate the results of ESWT in the treatment of fractures and delayed unions/nonunions. Ten studies were included and involved 924 patients who underwent one to three treatment sessions. The overall union rate in patients with delayed union/nonunion was 76% and ranged from 41% to 85%. The authors concluded that while promising, ESWT for the treatment of fractures and delayed unions/nonunions requires further studies. Additional studies need to investigate how shock wave therapy compares with other treatment approaches and if different anatomic fracture locations demonstrate different success rates. In addition, the optimal treatment dose needs to be identified in further investigations.

A RCT by Cacchio et al. (2009) compared ESWT with surgical treatment in 126 patients with long-bone non-unions. Outcomes were measured using x-rays. Each group showed the same amount of healing at six, 12 and 24 months. The authors concluded that ESWT is as effective as surgery in stimulating union of long-bone hypertrophic non-unions. The study is limited by lack of blinding and a control group. Additional studies are needed to further validate the results.

Hammer Toe

A detailed search of the medical peer-reviewed literature did not identify any clinical studies that evaluated ESWT for the treatment of hammer toe.

Lateral Epicondylitis (Tennis Elbow)

Evidence in the form of RCT regarding the efficacy of ESWT for LE is conflicting and inconsistent.

Cetin et al. (2024) conducted a randomized prospective study comparing the clinical outcomes of patients with LE treated with local massage, corticosteroid (CS) injection, and ESWT. After exclusions the study included thirty-eight patients (Group 1/local massage 9; Group 2/CS injection 13; Group 3/ESWT: 16) who had not received any treatment for the LE in the last six months. All three groups were clinically evaluated using the Visual Analog Scale (VAS) Disabilities of the Arm, Shoulder, and Hand (DASH), and DASH-Work Model (DASH-WM) scores at the initial examination at the beginning of the study and at two-week, three-month, and six-month follow-up. The results demonstrated in Group 1, all three scores decreased significantly in the first two weeks, but no significant difference was observed in any of the scores at the six-month follow-up. Group 2 showed a significant decrease in all scores at two weeks, whereas no statistically significant decrease was observed in any of the scores at six months. However, a significant decrease was observed in VAS and DASH scores at three months. Group 3 showed statistically significant decreases in all scores throughout the follow-up period. The authors concluded ESWT was superior to both local massage and CS injection treatments throughout the study and at final follow-up. However, there are relatively few studies that show the superiority of these treatments over one another and there is still no consensus on a standard, effective method used for LE. Further studies on combined treatment modalities are needed on this subject. Limitations include small sample size, study design and short follow-up.

A systematic review and network meta-analysis by Liu et al. (2022) was completed to examine the efficacy of ESWT and injection therapies by synthesizing direct and indirect evidence for all pairs of competing therapies for LE. PubMed, EMBASE, and Web of Science databases were searched for all appropriate RCTs, assessing the effect of ESWT or injection therapies. The primary outcome was short-term (≤ 3 months) and medium-term (> 3 months but ≤ 12 months) pain, while the secondary outcomes were grip strength and patient-reported outcome measures. All outcomes were assessed using standardized mean differences (SMDs) with 95% confidence intervals and were ranked using surface under the cumulative ranking curve (SUCRA) probabilities to determine a hierarchy of treatments. Sensitivity analysis was performed to eliminate potential therapeutic effects of normal saline (NS) and exclude trials that included patients with acute LE. Results: 40 RCTs were included to evaluate ESWT and five different injection therapies, including corticosteroids, autologous whole blood, platelet-rich plasma (PRP), botulinum toxin A (BoNT-A), and dextrose prolotherapy (DPT). DPT [-.78 (-1.34 to -.21)], ESWT [.57 (-.89 to -.25)], platelet-rich plasma [-.48 (-.85 to -.11)], and BoNT-A [-.43 (-.84 to -.02)] outperformed placebo for short-term pain relief; ESWT [-.44 (-.85 to -.04)] outperformed placebo for medium-term pain relief. DPT was ranked as the most optimal short-term and medium-term pain reliever (SUCRA, 87.3% and 98.6%, respectively). ESWT was ranked as the most optimal short-term and medium-term grip strength recovery (SUCRA; 79.4% and 86.4%, respectively). The authors concluded that DPT and ESWT were the best two treatment options for pain control and ESWT was the best treatment option for grip strength recovery. Corticosteroids were not recommended for the treatment of LE. More evidence is required to confirm the superiority in pain control of DPT among all these treatment options on LE. Limitations to the study included no standardized treatment protocol for each treatment, as well as no standardized protocols and treatment modalities in ESWT. The effectiveness of ESWT may change with the evolution of the times and advancement of machines. Further research with RCT is needed to validate these findings.

Özmen et al. (2021) performed a comparison study to determine the clinical and sonographic effects of ultrasound (US) therapy, ESWT, and Kinesio taping (KT) in LE. A total of 40 patients with LE were included in the study. The patients were randomly assigned to three treatment groups: US (n = 13), ESWT (n = 14), and KT (n = 13) groups. The VAS scores decreased in all groups ($p < 0.05$). Grip strength increased after eight weeks in only the KT group ($p < 0.05$). The Patient-Rated Tennis Elbow Evaluation Scale scores significantly decreased after two weeks and after eight weeks in the US group and ESWT groups, and after eight weeks in the KT group ($p < 0.05$). Common extensor tendon (CET) thicknesses decreased after eight weeks in only the ESWT group ($p < 0.05$). The authors concluded that the US therapy, KT, and ESWT are effective in reducing pain and improving functionality. However, none of these treatment methods were found to be superior to others in reducing the pain and improving functionality. Limitations of the study include small sample size (40 patients) and short duration of follow-up. Also, there was no exercise intervention in addition to the treatment methods applied. Grip strength may be increased by strengthening the forearm muscles.

Atalay and Gezginaslan (2020) completed a RCT to evaluate the effectiveness of neural therapy (NT) versus ESWT in the treatment of LE. Between August 2018 and November 2018, 76 patients with LE (26 males, 50 females; mean age: 44, 8 ±9,5 years; range, 29-65 years) were randomly allocated to either NT or ESWT one session weekly for a total of three weeks. The subjective pain severity was evaluated using the VAS and Duruoz Hand Index (DHI) was used to assess the functional disability before and after treatment and at 12 weeks. When the before and after treatment and 12 weeks variances of values were compared between ESWT and NT groups, there were no differences in the VAS and DHI scores between the groups ($p > 0.05$) [VAS score at 12 weeks (effect size = 0, 18, 95% confidence interval {CI}: -0,358-1,619) or DHI score (effect size = 0, 13, 95% CI: -7,627-4,390)]. However, within the groups, there were differences in VAS and DHI scores between before treatment and after treatment ($p < 0.05$), and between before treatment and at 12 weeks follow up ($p < 0.05$). No adverse events occurred in this study. The authors concluded that the results of this study showed that both ESWT and NT have similar effects in reducing pain and hand function in patients with LE. However neither of two the treatment modalities showed superiority. There are some limitations to this study. The number of subjects in the study is small which could have decreased the power of the study. As there was no control group, the authors could not determine the effect of two therapeutic methods. The lack of blinding, qualitative data/feedback from patients, non-treatment group or routine care group, and long-term outcomes are the other limitations of the study. Further investigation with large-scale, prospective, long-term outcomes, placebo-controlled studies are needed.

In a systematic review and meta-analysis by Yao et al. (2020), the authors found that additional high quality RCTs are still needed to validate that ESWT safely and effectively relieves the pain and functional impairment from LE. The meta-analysis included 13 published RCTs that included 1,035 patients, of which 501 patients received ESWT and 534 received other treatments. Due to the heterogeneity of the studies, the authors performed a pooled analysis of the data, which they concluded showed significantly lower VAS scores (0 indicating no pain and 10 the worst pain) indicative of early recovery and significantly increased grip strength in the ESWT treatment group. There were also several limitations of the meta-analysis identified by the authors, including different ESWT instruments, treatment protocols, diagnostic criteria, and the fact that the majority of the studies were conducted in one country. The authors concluded that future RCTs should address these limitations.

Another systematic review and meta-analysis completed in 2020 by Yoon et al. focused on the effect of ESWT on LE for reducing pain and improving grip strength as well; however, the analysis also investigated the effects of ESWT according to the specific type applied, symptom duration and follow up duration. In this review, 12 studies with 1,104 patients were included in the meta-analysis with ten of the 12 studies having also been included in the Yao systematic review and meta-analysis. This meta-analysis concluded that ESWT did not show clinically important improvement in pain reduction and grip strength although the authors did conclude that radical ESWT was more effective than focused ESWT and that patients with longer duration of symptoms had more improvement while the effects did not last beyond 24 weeks. Yoon et al. also noted the heterogeneity of the studies included in the review and the diversity of the treatment protocols, shock wave devices and length of treatment among the studies. The authors recommended future studies on specific conditions and parameters to establish optimal protocol settings for ESWT for LE.

Aydın and Atiç (2018) performed a prospective RCT comparing the efficacy of ESWT to wrist-extensor splint (WES) application in the treatment of LE. Patients were included if they had been treated based on a diagnosis of unilateral LE. Patients were excluded if they had bilateral LE, carpal tunnel syndrome, cubital tunnel syndrome, previous elbow surgery, previous conservative and surgical treatment for LE, neurological deficits in the upper extremity, systemic disease, other diseases in the neck and shoulder region, lateral epicondylar tendon ruptures, tumors in the forearm and elbow, osteoporosis, and hemophilia. The patients were randomized into two groups. Group one received ESWT four times per week using the DolorClast device and group two received a wrist extensor splint. The primary outcomes measured were the effectiveness of ESWT compared to WES in decreasing pain, improving grip strength, increasing quality of life, and alleviating arm pain during daily life activities in the treatment of LE. Evaluation data were collected before and after treatment at weeks four, 12, and 24. In both groups there were significant improvements in decreasing pain, increasing grip strength and improving quality of life at four, 12, and 24 weeks compared to pretreatment values. However, there was no statistically significant difference between the two groups at the three time points. The authors noted limitations of the study were the small patient population and use of the patient-reported questionnaires.

Capan et al. (2016) conducted a double-blind, randomized, placebo-controlled trial in outpatient clinics of a medical faculty hospital. Fifty-six patients with LE were randomized to radial ESWT or sham radial ESWT groups. Both the patients and the outcome assessing investigator were blinded to group assignment. The radial ESWT was administered to the painful epicondyle at the elbow at each session at three once weekly sessions. Sham radial ESWT was applied without the contact of the applicator at the same area. Study patients were assessed at baseline and at one and three months after treatment using a VAS for pain and Roles and Maudsley scale and Patient-Rated Tennis Elbow Evaluation for pain and function. Grip strength of the affected extremity was also measured using a hand dynamometer. Both radial ESWT and sham radial ESWT groups showed a significant improvement in all outcome measures at post treatment follow-up points. Favorable absolute and percentage changes in assessments at one- and three-months post treatment did not show any significant difference between groups. The authors concluded radial ESWT does not seem to be more effective either in reducing pain or improving function or grip strength in patients with LE at least at three months after treatment when compared with sham radial ESWT.

Refractory Greater Trochanteric Pain Syndrome (GTPS)

There is insufficient quality evidence to conclude ESWT is effective for GTPS; therefore, additional research involving larger, well-designed studies is needed to establish its safety and efficacy.

Harding et al. (2024) conducted a systematic review and meta-analysis to investigate the efficacy of shock wave therapy (SWT) on pain and function in the management of GTPS compared to alternative treatment interventions. The study included a total of 1,221 participants of which 849 underwent SWT and post treatment follow-up ranged from one week to two years. The results demonstrated within RCTs, large treatment effects were identified across all follow-up timepoints for pain in SWT groups. Following SWT in non-RCTs, a large treatment effect for pain was consistently seen across all timepoints. Moderate-large functional treatment effects of SWT in RCTs were seen at all follow-up timepoints. Within non-RCTs SWT resulted in moderate treatments effects in all time points. The authors concluded although moderate strength evidence was found, SWT was not significantly beneficial compared to control for pain or function over time. Further robust RCTs investigating the impact of optimal treatment protocols of SWT on acute versus chronic would be beneficial for optimizing patient care. Limitations in the study include methodological heterogeneity, risk of bias, and lack of standardization.

The ECRI Institute published an Executive Summary on the use of ESWT for chronic lateral hip pain/GTPS with a focus on the safety and efficacy of ESWT used with or in place of physical therapy, pain medication, and other non-surgical treatments. The review included one systematic review (n = 295) of controlled studies and two RCTs (n = 103 and n = 50) that were not included in the systematic review. The Executive Summary concluded that the evidence is inconclusive due to limited data available and the high risk of bias from the studies reviewed because of lack of randomization or complete blinding, small size, high attrition, and single-center focus. Other published data that were not included in the review were excluded because the risk of bias was higher and because there were too few patients per treatment. ECRI Institute recommended large, multi-centered studies to validate available data and to assess long term outcomes related to pain recurrence and retreatment. (ECRI 2020).

Ramon et al. (2020) completed a randomized, multicenter clinical trial with 103 participants with chronic GTPS. The participants were divided into two groups, both of which were treated with three weekly sessions of focused extracorporeal shockwave treatment (F-ESWT) with the test group (n = 53) receiving an energy flux density (EFD) of 0.20 mJ/mm^2 and the control group (n = 50) receiving the lowest EFD of the device (0.01 mJ/mm^2) using the same brand of device. Each participant was assessed at baseline and one, two, three, and six months after the last session by clinicians blinded to the group allocation. The authors concluded that F-ESWT and a specific home exercise program is safe and effective for GTPS, with a success rate of 86.8% at two months after treatment that was maintained until the end of the six-month follow-up. Limitations identified by the authors included a lack of follow-up beyond six months, a lack of exact data on participants' compliance with the home exercise protocol, the imbalance of participation by women (n = 74) to men (n = 29) in a sample size of only 103, which may not detect important differences in responses to the intervention between the sexes and that the control group received some, albeit the lowest dose of ESWT, so it could be considered a quasi-placebo group. The authors recommend further high-quality RCT to confirm the long-lasting effectiveness of F-ESWT for GTPS.

In 2015, Mani-Babu et al. reported results of a systematic review and meta-analysis of studies evaluating ESWT for lower limb tendinopathies, including GTPS. The review included 13 studies providing sufficient data to compute effect size calculations. The energy level, number of impulses, number of sessions, and use of a local anesthetic varied between studies. The authors concluded that there was limited to moderate evidence to support EWST as an effective intervention and should be considered for GTPS when other nonoperative treatments have failed.

Tenosynovitis of the Foot or Ankle

A detailed search of the medical peer-reviewed literature did not identify any clinical studies that evaluated ESWT for the treatment of tenosynovitis of the foot or ankle.

Tibialis Tendonitis

A detailed search of the medical peer-reviewed literature did not identify any clinical studies that evaluated ESWT for the treatment of tibialis tendonitis.

Wounds

ESWT mechanisms of action for wound healing are not fully elucidated in the literature. The current understanding is that the mechanical effects of the shock waves on cells trigger biological responses that enhance tissue perfusion and angiogenesis.

Hitchman et al. (2023) conducted a systematic review aimed at the role of ESWT in diabetic foot ulcer (DFU) healing and the impact of different ESWT doses. In total six RCTs published between 2009 and 2019 were analyzed. The primary outcome of the study was time to healing. The results demonstrated time to ulcer healing was probably shorter in patients treated with ESWT compared to standard ulcer care alone. Patients treated with ESWT were more likely to heal at twenty weeks post-ESWT compared with those treated with standard ulcer care alone. The authors concluded ESWT remains a promising new treatment but the translation into routine clinical practice is still limited by the low certainty of evidence surrounding its effectiveness, case selection and optimum dose. Future trials are necessary and must be conducted in a scientific rigorous way to prevent wasting of resources and improve DFU care. Limitations in the study include risk of bias, small sample size and heterogeneity.

The ECRI Institute published a Clinical Evidence Assessment on the dermaPACE System in 2020, that focused on how the device compares with standard of care and other chronic wound treatments. ECRI concluded that the evidence is somewhat favorable when comparing dermaPACE with standard of care alone as it appears to improve complete DFU healing rates at 24-week follow-up and decreases time to wound closure. ECRI based their recommendation on two low-quality RCTs (n = 206, n = 130) that were multi-centered and double blinded based on pooled data from the same study participants. ECRI also reviewed a third RCT from a single-center, open-label study (n = 77; 84 ulcers) that compared dermaPACE with hyperbaric oxygen therapy in patients with chronic DFUs and reported rates of complete wound closure, improved healing, unchanged ulcers, and adverse events. They did not find any published studies that evaluated the effectiveness of dermaPACE for treating chronic wound types other than DFUs. dermaPACE has been granted de novo clearance by the FDA only for treating DFUs at this time, although it is intended to treat chronic wounds more broadly.

Huang et al. (2020) performed a systematic review and meta-analysis of eight RCTs (n = 339) to assess the safety and efficacy of ESWT on the healing of DFUs. The authors concluded that ESWT was associated with a greater reduction of the wound surface area, an increase of re-epithelialization and more patients with complete cure at the end of treatment. All the included studies were conducted by different medical centers in different countries with varied treatment protocols for treatment strength, frequency, and duration. Patient ages ranged from 56.2 to 67.8 years. The control groups in the studies also received various treatments with standard wound care in six RCTs and hyperbaric oxygen therapy (HBOT) in two studies. The authors also found that ESWT was more effective than HBOT for treating DFUs. Limitations identified by the authors include the application of ESWT only to DFU wounds, the small number of included studies in the meta-analysis (< 10) and that cost effectiveness was not reviewed.

In a systematic review and meta-analysis, Zhang et al. (2018) examined the effects of ESWT and conventional wound therapy (CWT) for acute and chronic soft tissue wounds. A total of ten RCTs involving 473 patients were included in this systematic review and meta-analysis. The meta-analysis showed that ESWT statistically significantly increased the healing rate of acute and chronic soft tissue wounds 2.73-fold (OR = 3.73, 95% CI: 2.30 to 6.04, $p < 0.001$) and improved wound-healing area percentage by 30.45% (SMD = 30.45; 95% CI: 23.79 to 37.12; $p < 0.001$). ESWT reduced wound-healing time by 3 days (SMD = -2.86, 95% CI: -3.78 to -1.95, $p < 0.001$) for acute soft tissue wounds and 19 days (SMD = -19.11, 95% CI: -23.74 to -14.47, $p < 0.001$) for chronic soft tissue wounds and the risk of wound infection by 53% (OR = 0.47, 95% CI: 0.24 to 0.92, $p = 0.03$) when compared with CWT alone. Serious adverse effects were not reported. The authors concluded that ESWT showed better therapeutic effects on acute and chronic soft tissue wounds compared with CWT alone. However, the authors noticed that higher-quality and well-controlled RCTs are needed to further evaluate the role of ESWT for acute and chronic soft tissue wounds.

Omar et al. (2017) performed a systematic review of ten databases for clinical trials about ESWT in the management of chronic wound of lower extremity (CWLE). These were published between 2000 and 2016. A total of 11 studies with 925 patients were found. Expert therapists assessed the methodological qualities of the selected studies using the Physiotherapy Evidence Database (PEDro) scale and categorized each study according to Sackett's levels of evidence. Eight studies were categorized as level II; two studies were categorized as level III and one study was categorized as level V. In conclusion, this review demonstrated mild to moderate evidence to support the use of ESWT as an adjuvant therapy with a standardized wound care program. However, it is difficult to draw firm conclusions about the efficacy of ESWT. So, future research with high methodological quality is required to assess the efficacy and cost-effectiveness of this relatively new physical therapy application.

In a phase II RCT, Ottomann et al. (2011) evaluated shock wave effects in burn wounds. A predefined cohort of 50 patients (6 with incomplete data or lost to follow-up) with acute second-degree burns were randomly to receive standard therapy (burn wound debridement/topical antiseptic therapy) with (n = 22) or without (n = 22) defocused ESWT applied once to the study burn, after debridement. Randomization sequence was computer-generated, and patients were blinded to treatment allocation. Mean time to complete (≥ 95%) epithelialization (CE) for patients that did and did not undergo ESWT was 9.6 ±1.7 and 12.5 ±2.2 days, respectively. The authors concluded that the application of a single defocused shock wave treatment to the superficial second-degree burn wound after debridement/topical antiseptic therapy significantly accelerated epithelialization. However, they also indicated that this finding warrants confirmation in a larger phase III trial.

U.S. Food and Drug Administration (FDA)

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

The FDA has classified extracorporeal shock wave therapy (ESWT) products as class III devices through the premarket approval program (PMA) under the product code NBN (generator, shock-wave, for pain relief).

Devices used for extracorporeal shock wave therapy are extensive. Refer to the following website for more information and search by product name in the device name section:
http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm. (Accessed May 31, 2024)

References

Atalay SG, Gezginaslan O. Effect of neural therapy versus extracorporeal shock wave therapy for the treatment of lateral epicondylitis: a randomized-controlled trial. Eur J Integ Med. 2020 Sept;39(101210):1876-3820.

Aydın A, Atiç R. Comparison of extracorporeal shock-wave therapy and wrist-extensor splint application in the treatment of lateral epicondylitis: a prospective randomized controlled study. J Pain Res. August 2018.

Bannuru RR, Flavin NE, Vaysbrot E, et al. High-energy extracorporeal shock-wave therapy for treating chronic calcific tendinitis of the shoulder: a systematic review. Ann Intern Med. 2014.

Cacchio A, Giordano L, Colafarina O, et al. Extracorporeal shock-wave therapy compared with surgery for hypertrophic long-bone nonunions. J Bone Joint Surg Am. 2009 Nov;91(11):2589-97.

Canadian Agency for Drugs and Technologies in Health (CADTH). CADTH Rapid Response Reports. Shockwave therapy for pain associated with lower extremity orthopedic disorders: A review of the clinical and cost-effectiveness. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2016 Sep.

Canadian Agency for Drugs and Technologies in Health (CADTH). CADTH Rapid Response Reports. Shockwave therapy for pain associated with upper extremity orthopedic disorders: A review of the clinical and cost-effectiveness. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2016 Sep.

Capan N, Esmaeilzadeh S, Oral A, et al. Radial extracorporeal shock wave therapy is not more effective than placebo in the management of lateral epicondylitis: A double-blind, randomized, placebo-controlled trial. Am J Phys Med Rehabil. July 2016.

Çetin BV, Sepetçi Ö, Yazar İ, et al. Comparison of local massage, steroid injection, and extracorporeal shock wave therapy efficacy in the treatment of lateral epicondylitis. Jt Dis Relat Surg. 2024 Apr 26;35(2):386-395.

ECRI. dermaPACE System (Sanuwave Health, Inc.) for treating chronic wounds. October 2020. (Clinical Evidence Assessment).

ECRI. Extracorporeal shock wave therapy for chronic lateral hip pain. November 2020. (Executive Summary).

Elster EA, Stojadinovic A, Forsberg J, Shawen S, Andersen RC, Schaden W. (2010). Extracorporeal shock wave therapy for nonunion of the tibia. J Orthop Trauma, 24, 133-141.

Feeney KM. The effectiveness of extracorporeal shockwave therapy for midportion Achilles tendinopathy: a systematic review. Cureus. 2022 Jul 18;14(7):e26960.

Harding D, Cameron L, Monga A, Winter S. Is shockwave therapy effective in the management of greater trochanteric pain syndrome? A systematic review and meta-analysis. Musculoskeletal Care. 2024 Jun;22(2):e1892.

Hayes, Inc. Health Technology Assessment. Extracorporeal shock wave therapy for calcific tendonitis of the shoulder. Hayes, Inc.; August 5, 2022. Updated August 2023.

Hitchman L, Totty J, Smith GE, et al. Extracorporeal shockwave therapy compared with standard care for diabetic foot ulcer healing: An updated systematic review. Int Wound J. 2023 Aug;20(6):2303-2320.

Huang Q, Yan P, Xiong H, et al. Extracorporeal shock wave therapy for treating foot ulcers in adults with Type 1 and Type 2 diabetes: A systematic review and meta-analysis of randomized controlled trials. Can J Diabetes. 2020 Mar;44(2):196-204.e3.

Kwok IHY, Leong E, Aljalahma MA, et al. Extracorporeal shock wave treatment in foot and ankle fracture non-unions - A review. Foot (Edinb). 2022 May;51:101889.

Liu WC, Chen CT, Lu CC, et al. Extracorporeal shock wave therapy shows superiority over injections for pain relief and grip strength recovery in lateral epicondylitis: a systematic review and network ,eta-analysis. Arthroscopy. 2022 Jun;38(6):2018-2034.e12.

National Institute for Health and Care Excellence (NICE). IPG571. Extracorporeal shockwave therapy for Achilles tendinopathy. December 21, 2016.

National Institute for Health and Care Excellence (NICE). IPG742. Extracorporeal shockwave therapy for calcific tendinopathy in the shoulder. November 9, 2022.

Omar MT, Gwada RF, Shaheen AA, et al. Extracorporeal shockwave therapy for the treatment of chronic wound of lower extremity: current perspective and systematic review. Int Wound J. 2017 Dec;14(6):898-908.

Ottomann C, Stojadinovic A, Lavin PT, et al. Prospective randomized phase II trial of accelerated reepithelialization of superficial second-degree burn wounds using extracorporeal shock wave therapy. Ann Surg. 2011 Aug 17.

Özmen T, Koparal SS, Karataş Ö, et al. Comparison of the clinical and sonographic effects of ultrasound therapy, extracorporeal shock wave therapy, and kinesio taping in lateral epicondylitis. Turk J Med Sci. 2021 Feb 26;51(1):76-83.

Ramon, S, Russo, S, Santoboni, F, et al. Focused shockwave treatment for greater trochanteric pain syndrome: a multicenter, randomized, controlled clinical trial. J Bone Joint Surg Am. 2020;102(15):1305-1311.

Schneider HP, Baca J, Carpenter B, et al. American College of Foot and Ankle Surgeons Clinical Consensus Statement: diagnosis and treatment of adult acquired infracalcaneal heel pain. J Foot Ankle Surg. 2017; 57(2):370-381.

Searle HK, Lewis SR, Coyle C, et al. Ultrasound and shockwave therapy for acute fractures in adults. Cochrane Database Syst Rev. 2023 Mar 3;3(3):CD008579.

Shao H, Zhang S, Chen J, et al. Radial extracorporeal shockwave therapy reduces pain and promotes proximal tendon healing after rotator cuff repair: Randomized clinical trial. Ann Phys Rehabil Med. 2023 Apr 5;66(4):101730.

Stania M, Juras G, Chmielewska D, et al. Extracorporeal shock wave therapy for Achilles tendinopathy. Biomed Res Int. 2019 Dec 26;2019:3086910.

Stania M, Malá J, Chmielewska D. The Efficacy of Extracorporeal Shock Wave Therapy as a Monotherapy for Achilles Tendinopathy: A Systematic Review and Meta-Analysis. J Chiropr Med. 2023 Dec;22(4):294-301.

Staples MP, Forbes A, Ptasznik R, et al. A randomized controlled trial of extracorporeal shock wave therapy for lateral epicondylitis (tennis elbow). J Rheumatol. 2008 Oct;35(10):2038-46.

Surace SJ, Deitch J, Johnston R, et al. Shock wave therapy for rotator cuff disease with or without calcification. Cochrane Database Syst Re. 2020 Mar 4;3:CD008962.

Testa G, Vescio A, Perez S, Consoli A, et al. Extracorporeal shockwave therapy treatment in upper limb diseases: A systematic review. J Clin Med. 2020 Feb 6;9(2). pii: E453.

Verstraelen FU, in den Kleef NJ, Jansen L, et al. High-energy versus low-energy extracorporeal shock wave therapy for calcifying tendinitis of the shoulder: which is superior? A meta-analysis. Clin Orthop Relat Res. 2014.

Washington State Health Care Authority Health Technology Assessment 2017. “Extracorporeal shock wave therapy (ESWT) for musculoskeletal conditions”.

Willems A, van der Jagt OP, Meuffels DE. Extracorporeal shock wave treatment for delayed union and nonunion fractures: A systematic review. J Orthop Trauma. 2019 Feb;33(2):97-103.

Xue X, Song Q, Yang X, et al. Effect of extracorporeal shockwave therapy for rotator cuff tendinopathy: a systematic review and meta-analysis. BMC Musculoskelet Disord. 2024 May 4;25(1):357.

Yao G, Chen J, Duan Y, Chen X. Efficacy of extracorporeal shock wave therapy for lateral epicondylitis: A systematic review and meta-analysis. Biomed Res Int. 2020:2064781.

Yoon SY, Kim YW, Shin IS, et al. Does the type of extracorporeal shock therapy influence treatment effectiveness in lateral epicondylitis? A systematic review and meta-analysis. Clin Orthop Relat Res. 2020 Oct;478(10):2324-2339.

Zhang L, Fu XB, Chen S, et al. Efficacy and safety of extracorporeal shock wave therapy for acute and chronic soft tissue wounds: A systematic review and meta-analysis. Int Wound J. 2018;15(4):590-599.

Zelle BA, Gollwitzer H, Zlowodzki M, et al. Extracorporeal shock wave therapy: current evidence. J Orthop Trauma. 2010 Mar;24 Suppl 1:S66-70.

Policy History/Revision Information

Date	Summary of Changes
06/01/2025	• New Medical Policy

Instructions for Use

This Medical Policy provides assistance in interpreting UnitedHealthcare standard benefit plans. When deciding coverage, the federal, state, or contractual requirements for benefit plan coverage must be referenced as the terms of the federal, state, or contractual requirements for benefit plan coverage may differ from the standard benefit plan. In the event of a conflict, the federal, state, or contractual requirements for benefit plan coverage govern. Before using this policy, please check the federal, state, or contractual requirements for benefit plan coverage. UnitedHealthcare reserves the right to modify its policies and guidelines as necessary. This Medical Policy is provided for informational purposes. It does not constitute medical advice.

UnitedHealthcare uses InterQual® for the primary medical/surgical criteria, and the American Society of Addiction Medicine (ASAM) criteria for substance use disorder (SUD) services, in administering health benefits. If InterQual® does not have applicable criteria, UnitedHealthcare may also use UnitedHealthcare Medical Policies that have been approved by the Kansas Department of Health and Environment. The UnitedHealthcare Medical Policies are intended to be used in connection with the independent professional medical judgment of a qualified health care provider and do not constitute the practice of medicine or medical advice.