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Analysis of Traditional Chinese Medicine and Western Medicine in Ankle Sprain and Fracture Treatment

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Abstract. Ankle joint injuries have become a major global health burden, affecting millions of people every year. This thorough analysis looks at the basic clinical procedures and philosophical distinctions between Western medicine and Traditional Chinese Medicine (TCM) in the treatment of ankle fractures and sprains. This study identifies different therapeutic paradigms by methodically analyzing current clinical evidence: Western medicine emphasizes standardization and evidence-based approaches, such as the PRICE principle, drug intervention and surgical treatment; TCM adopts holistic treatment, including acupuncture and moxibustion, herbal medicine and individualized treatment based on the theory of qi and blood movement. Compared with monotherapy, the combination of TCM-Western medicine has better treatment effects, significantly higher cure rates, fewer complications, better functional recovery and shorter healing times. Western medicine still dominates in the accuracy of acute phase diagnosis and standardized treatment plans, while TCM has unique advantages in pain management, overall rehabilitation, and promoting the rehabilitation process. Although acupuncture treatment for ankle sprains shows encouraging results, the analysis shows that the evidence needs more thorough scientific evaluation because of the substantial heterogeneity across studies. An ideal therapeutic approach is presented by combining the two medical traditions, with TCM helping to optimize recovery and prevent complications and Western medicine managing the acute phase.

Keywords: Ankle injuries, integrated treatment, therapeutic efficacy

1. Introduction

Ankle fractures alone account for 10% of hospital bed stays and 14% of all fractures requiring hospitalization, making ankle injuries one of the most common musculoskeletal conditions in the world. With a mortality rate of 11.9% in patients over 65 within a year of hospitalization, the epidemiological burden is significant, affecting the lateral malleolus in 55% of cases and frequently occurring as a result of sports activities in younger populations (18–25 years old) or low-energy falls in elderly patients [1]. The present high clinical burden requires the best treatment options that would be effective in dealing with acute stages of injury and chronic functional restoration.

The modern medical environment offers an interesting optic of co-existence of two radically divergent medical paradigms of treating ankle injuries. Western medicine is based on evidence-based practice and biomedical science and focuses on accurate anatomical diagnosis, uniform

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treatment procedures, and as needed, advanced surgical procedures. Using the PRICE technique (Protection, Rest, Ice, Compression, Elevation), pharmaceutical agents and more complex surgical treatment, such as the open reduction and internal fixation (ORIF) of complex fractures, are usually used in the Western treatment of ankle injuries [1]. Modern Western practice has developed to include early mobilization treatment plans, and it has also been shown that early weight-bearing treatments might lead to improved recovery when compared to classical immobilization ones [2].

Conversely, ankle injuries are treated by TCM using totally different theoretical paradigms and these are the restoration of qi-blood circulation, meridian equilibrium, and pattern differentiation. TCM treatments include acupuncture, herbs, manual treatments and exercise prescriptions to re-establish energetic balance and allow natural healing to occur. The TCM paradigm does not treat ankle injuries as simple local mechanical issues, but as an expression of constitutional imbalances that need to be treated holistically and with multifactorial intervention measures that focus on both local symptomology and system imbalances. The potential benefits of the union of these different medical traditions have been newly revealed in systematic studies. Compared to a regular Western treatment regimen, meta-analytic data indicate that TCM-Western medicine regimens are more effective in the treatment of musculoskeletal disorders. The cure rates, the number of complications, and the healing time are much better with these protocols [3]. In particular, the research about the impact of acupuncture on the population with ankle sprains showed that although the results shown on the individual studies were promising, excessive heterogeneity in the study design and the measurements it provides was also observed, which was used as the indication of the need to carry out a further scientific analysis of the overall findings [4].

One of the latest updates in the sphere of modern healthcare is the combination of Western and TCM approaches, which is especially important when it comes to musculoskeletal health issues, since not only the emergency cases but also the long-term rehabilitation to attain the best possible results are crucial. As a new issue has arisen of conventional methods of pharmaceuticals and especially the suggestion that NSAIDs have a negative effect on the healing process of bones, this assimilation is greater than ever before. Although the acute intake of NSAIDs seems quite safe, recent meta-analyses indicated that using them might cause additional complications during the healing process of the fractures since it increases the possibility of nonunion development, with the combined odds ratios of 3.0 of the given nonunion risk [5]. Based on these findings, there is a strong necessity to conduct a research on the complementary and alternative treatment procedures, which have the potential of managing pain and enhancing the healing process without any harm to the healing process.

This paper critically analyzes the advantages, the limitations and the opportunities of combining traditional Chinese medicine and Western ways of treating ankle sprains and fractures. By carrying out a systematic review of the current clinical research on the topic, the purpose of the research is to hope that it would have a framework of ideas of how these various medical traditions can best be combined in the management of ankle injuries to increase long-term functional recovery, minimize complications and optimize patient outcomes.

2. Comparative analysis of traditional Chinese medicine and Western medicine in ankle injury management

2.1. Philosophical foundations and diagnostic approaches

Western medicine follows the model of a biomedical approach based on the proper localization of the injury in anatomical terms and the mechanical experience of injury processes. The Western

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approach to the diagnosis uses the application of superior imaging solutions, including lateral and mortise view radiographs, the application of computed tomography in the case of a complex fracture, magnetic resonance imaging to study soft tissue, and provides very detailed anatomical information, which is critical at the stage of planning treatment [1]. The Ottawa Ankle Rules have transformed emergency department efficacy in that they have offered a validated method of radiographic determination of necessity with almost 100 percent sensitivity and a decrease of unnecessary radiography of 30-40 percent (see Figure 1) [6].

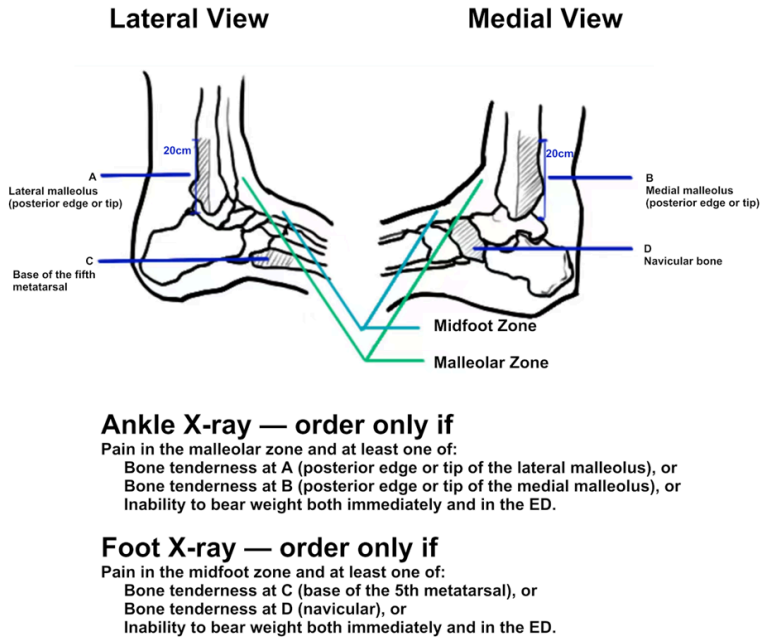

Figure 1. Ottawa ankle rules clinical decision process [6]

The superiority of Western medicine in terms of diagnosis can be explained by the fact that it is objective in measurement and evaluation because it can be reproduced. Treatment options are logically based on more complex classification systems, such as the Danis-Weber, where the treatment of Type A fractures is typically conservative, Type B need more specific evaluation, since they are variable in terms of stability, and Type C fractures need ORIF, as they are unstable and disrupt the syndesmosis (see Figure 2) [1,7]. The Western approach is better in neurovascular assessment, which entails examination of the capillary refill, pulse check and sensation. This will provide a proper evaluation of the degree of the injury and the potential complications.

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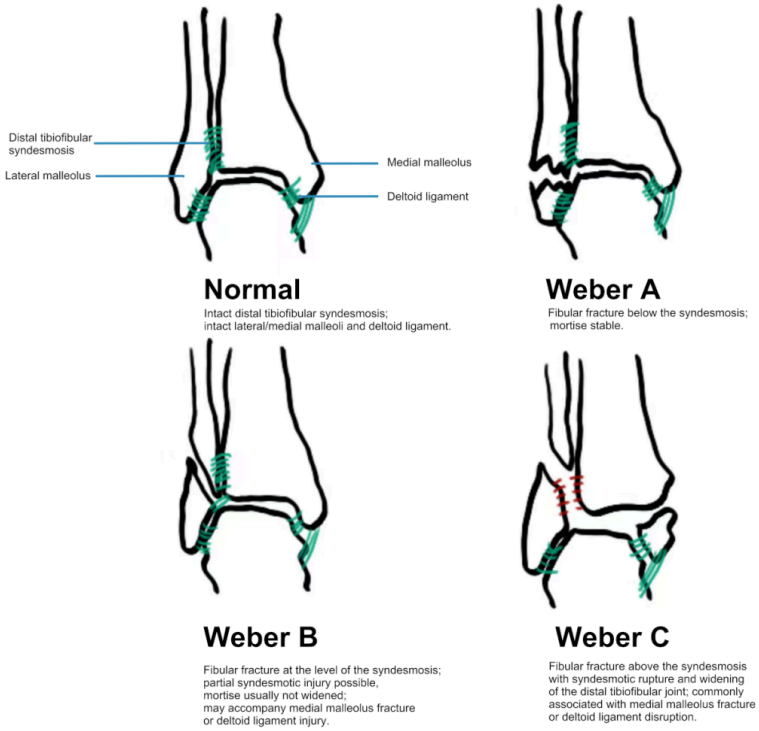

Figure 2. Representative graphs illustrating lateral-malleolar fractures classified as Weber A (infrasyndesmotic), Weber B (trans-syndesmotic) and Weber C (suprasyndesmotic) [7]

Conversely, the focus of diagnosis in Traditional Chinese Medicine is less anatomically discrete and more based on a personal assessment and a pattern recognition. TCM practitioners take into account such qualities as the appearance of the tongue, the quality of the pulse, the patterns of qi-blood circulation, and the organ system functioning when estimating ankle injuries against the background of overall constitutional patterns. This comprehensive assessment approach recognizes that the healing abilities of every individual vary widely according to his/her constitution, internal imbalances and the availability of energetic resources towards healing processes. The TCM diagnostic process, according to the guidelines of traditional Chinese medicine, considers the aspects of lifestyle and environmental factors that could influence the healing processes, including the work-rest balance, emotional condition, diet patterns, and seasonal considerations [8].

2.2. Acute phase management strategies

In order to reduce secondary injury and regulate inflammation, Western medicine's acute management of ankle injuries adheres to proven, evidence-based protocols. Although recent data indicate that adjustments toward early mobilization may be advantageous, the PRICE protocol remains the cornerstone of initial Western management. Western medicine uses advanced techniques when surgery is necessary, such as ORIF, which uses plates and screws to reduce and stabilize the mortise. Intraoperative fluoroscopy monitoring is used to guarantee the best possible reduction and fixation. In order to maximize results, the British Orthopaedic Association (BOA) guidelines stress the value of early fixation and advise surgery within 24 to 48 hours for suitable cases [9].

When it comes to treating severe trauma and complicated fractures that need to be stabilized right away, the Western method is obviously superior. The precise mechanical restoration of anatomical relationships is made possible by advanced surgical techniques, such as specialized approaches for

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comminuted high-energy injuries and interfragmentary lag screw fixation with neutralization plates for lateral malleolar fractures. While taking into account the possible effects of NSAIDs on bone healing processes, modern Western practice places a strong emphasis on evidence-based pain management protocols, employing graduated approaches that range from oral paracetamol for mild pain to intravenous morphine for severe symptoms. Acute ankle injuries are treated in Traditional Chinese Medicine using completely different conceptual frameworks, with a focus on preventing pathological stagnation and restoring local qi-blood circulation. TCM acute management usually consists of topical herbal applications with blood-activating and stasis-resolving properties, gentle manual techniques to restore energetic flow, and immediate stimulation of acupuncture points to increase circulation. The TCM approach acknowledges that acute trauma causes blood stasis and local qi stagnation, necessitating interventions that support the body's natural healing processes while mobilizing these energetic blockages, as outlined in the diagnostic and therapeutic frameworks of traditional Chinese medicine. Fascinatingly, recent studies indicate that combining acute-phase approaches may have synergistic benefits. The recovery time for ankle joint function is significantly improved by acupuncture plus standard physical therapy compared to standard therapy alone, with combination treatments reducing the time to stop treatment by an average of three days and recovering the plantar flexion-dorsiflexion range of motion by more than seven days [10]. These results imply that TCM interventions can improve acute management in Western medicine without sacrificing standard care procedures or safety.

2.3. Pain management paradigms

The Western medicine model of pain management in ankle injuries is based on pharmaceutical management, and it involves applying a gradual strategy to the use of paracetamol in an oral form to manage mild pain and morphine in an intravenous form to address severe pain [1]. Although this method has been a success in the short-term management of the symptoms, it is becoming more and more questioned in terms of its effects on healing. The latest meta-analyses suggest that NSAIDs use can potentiate problems in fracture healing, as the pooled odds ratios of nonunion risk are 3.0, especially when consumed over extended periods [5].

Western pharmacology is quick, measurable in terms of pain relief and has clearly defined doses and outcomes. Nevertheless, long-term possibility is restricted by the side effects, drug interaction and possible healing deterioration. It has been indicated that NSAIDs, which are widely used in the treatment of pain and inflammation due to ankle injury, can negatively impact fracture healing by inhibiting cyclooxygenase-2, and may have a significant effect on the endochondral ossification pathway necessary in the repair of bones [3,5]. TCM provides an alternative treatment method to pain management, which can be achieved by acupuncture, herbal combinations, and manual treatments that do not have the potential of hindering the healing process. Acupuncture analgesia is a multi-mechanism phenomenon that mediates effective analgesia by both activation of the gate control theory and the release of endogenous opioids, which produces no systemic side effects. The results of Cochrane reviews are also meta-analytic, as acupuncture treatment has been proven to significantly decrease the pain score in patients with ankle injuries, but the quality of evidence needs to be improved by means of more rigorous study designs [4].

TCM Chinese herbal pain treatment employs a blood-activating and qi-moving formula, which will not only relieve pain but also promote healing. In contrast to Western analgesics, which mainly interfere with pain transmission, TCM methods aim at the pathophysiological mechanisms of pain production, such as local stagnation, inflammation, and energetic obstruction. This method uses traditional formulations like those that contain Angelicae Gigantis Radix, Salviae Miltiorrhizae

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Radix, and Carthami Flos to promote healing and manage pain, avoiding potential conflicts between symptom control and recovery processes [3].

Detachable functional braces reduced the average time to return to work by roughly 17 days when compared to cast immobilization (mean difference = −17.17 days, 95% CI −33.00 to −1.34) and did not raise the risk of non-union (RR = 0.96, 95% CI 0.17–5.46), according to a 2025 meta-analysis that combined data from 11 RCTs and 1 472 adults [11]. A pilot RCT of transcutaneous electrical acupoint stimulation (TEAS) in surgically fixed ankles attenuated quadriceps cross-sectional muscle loss at four weeks, which complemented this mechanical freedom [12]. These converging findings imply that dynamic bracing supplies the needed biomechanical stimulus while TEAS may counter immobilisation-induced sarcopenia, aligning with TCM's tenet of "activating yang within stillness".

2.4. Rehabilitation and recovery approaches

Progression in rehabilitation of ankle injuries in Western medicine can be undertaken in evidence-based gradual steps as loading of the injured tissue, regaining of motion, and functional exercise progression. The components of physical therapy include balance training and proprioception strengthening techniques with controlled load types and regaining pre-injury capacity and prevention of recurrence [1]. Modern Western rehabilitation incorporates the principles of early mobilization, and recent data showed that immediate weight-bearing as tolerated could accelerate the healing process compared to the conventional techniques of immobilization.

When it comes to objective functional assessment and objective measures of progress, the Western model of rehabilitation is better. The possibility to control the recovery process efficiently and define the parts of persistence deficiency where particular intervention is required is given by the use of standardized outcome measures, the biomechanical assessment and analysis and the functional testing protocols. This systematic care guarantees the uniformity of the quality of rehabilitation and allows for the comparative effectiveness research of various treatment guidelines. Modern Western rehabilitation also applies to innovative technologies like virtual fracture clinics, which have proved to make a huge difference in the accessibility of patients, cost-effectiveness, and satisfaction rates [13].

TCM rehabilitation focuses on individual treatment with an emphasis on pattern differentiation and constitutional evaluation. TCM rehabilitation involves acupuncture to regulate meridians, prescription of specific exercises according to energetic concepts and herbal therapy to nourish qi-blood and support healing [14]. The TCM approach acknowledges that the best rehabilitation needs to tackle the constitutional weaknesses and energetic imbalances that can lead to the injury or hamper the healing process.

TCM rehabilitation procedures entail specific modalities like tuina massage, qigong exercises, as well as dietary therapy that are aimed at promoting healing internally. These methods are synergetic and improve circulation, decrease inflammation, reinforce the supportive tissues, and re-establish energy balance to achieve full recovery. According to recent protocol studies, TCM-Western hybrid rehabilitation programs are exhibiting better results than a Western-only program, with considerably high functional scores, low disability indices, and better quality of life measures [14].

2.5. Evidence quality and clinical effectiveness assessment

The long-term outcome evaluation shows possible benefits of combined strategies in the prevention of recurrence and the maximization of functional recovery. Western medicine has the advantage of

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an objective measure of the healing process and the ability to identify mechanical factors that predispose to re-injury using advanced imaging and biomechanical analysis in order to formulate prevention strategies. Nonetheless, Western solutions can be insufficient to resolve constitutional issues or balance problems that predispose people to injuries. The focus of TCM on constitutional reinforcement and the restoration of the balance of energies can offer distinctive advantages in terms of long-term protection against injuries and the optimization of functioning. Conventional interventions such as dietary therapy, lifestyle intervention, and continual constitutional support all deal with organic agents that can predispose to injury recurrence, yet high-quality long-term results data have not been widely obtained. The combination of the two should be promising in the overall prevention of the cause of ankle injuries and the consideration of both mechanical and constitutional causes.

The comparison of clinical efficacy provides significant differences between TCM and Western medicine evidence-based. The established research methodologies on Western medicine are randomized controlled trials, systematic reviews and meta-analyses, which offer excellent evidence on which to base treatment decisions. Western evidence-based shows a clear advantage in acute trauma care, diagnostic capabilities, and universal treatment guidelines, and the literature largely supports certain approaches to various types and levels of injuries [1].

Nonetheless, TCM studies are characterized by special methodological issues connected with personalized treatment, multi-modal complex interventions, and philosophical models that cannot be standardized. Cochrane systematic review of acupuncture in the treatment of ankle sprains encompassed 20 studies, 2012 subjects and did not draw any conclusions on the effectiveness and safety of the acupuncture treatment based on the currently available evidence, as the risk of bias was high and there was a high heterogeneity among the studies [14]. The review observed that only a single study had sufficient adverse event reporting among 20, which found skin problems in the subjects using over-the-counter traditional Chinese herbal patches as a control intervention, and most of the trials had insufficient adverse event reporting. Notwithstanding methodological drawbacks, new research points to the possible advantages of integrated approaches. Superior results are shown by meta-analytic data from studies looking at combined TCM-Western medicine protocols in a number of areas, such as cure rates, complication reduction, functional improvement, and healing time acceleration [3]. In comparison to Western medicine alone, integrated treatments resulted in statistically significant improvements in overall response rates (OR = 1.07, 95% CI = 1.12, P =.014), decreased incidence of adverse reactions (OR = 0.75, 95% CI = [0.63, 0.90], P =.021), and improved bone mineral density (OR = 0.65, 95% CI = [0.45, 0.84], P <.01), according to an analysis of 72 studies with 7847 participants.

2.6. Safety considerations and risk-benefit analysis

Important distinctions between TCM and Western medicine approaches are revealed by safety considerations. Standardized protocols in Western medicine offer comprehensive systems for tracking adverse events and carrying out corrective interventions, as well as explicit safety guidelines and established procedures for managing complications. However, worries about the negative effects of pharmaceuticals, especially with regard to NSAIDs and bone healing, draw attention to the possible drawbacks of traditional methods. Although there is little high-quality evidence and possible interactions with other risk factors, recent systematic reviews suggest that NSAIDs may have little effect on non-union or delayed union risks when used short-term [15].

The safety of TCM is usually good, especially in acupuncture and herbal treatment, but there are limited deep safety data. In the Cochrane review, most TCM studies reported inadequate adverse

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events and only a little information on their safety was available [4]. Nevertheless, safety tenets inherent to the TCM practice, such as constitution evaluation and treatment adaptation, could offer some form of extra safety that is lost in the design of conventional clinical trials.

A combination of the two might maximize safety by combining the acute care management opportunities of Western medicine with TCM interventions, which are gentle and supportive and have the effect of strengthening the healing process rather than having the potential to hinder it. This moderate position could reduce the pharmaceutical dependencies and still provide proper medical supervision and intervention potential in case of need, as seen in the integrated treatment regimens where complication rates were lower than with the single modality [3].

2.7. Long-term outcomes and recurrence prevention

The long-term outcome evaluation shows possible benefits of combined strategies in the prevention of recurrence and the maximization of functional recovery. Western medicine has the advantage of an objective measure of the healing process and the ability to identify mechanical factors that predispose to re-injury using advanced imaging and biomechanical analysis in order to formulate prevention strategies. Nonetheless, Western solutions can be insufficient to resolve constitutional issues or balance problems that predispose people to injuries.

The focus of TCM on constitutional reinforcement and the restoration of the balance of energies can offer distinctive advantages in terms of long-term protection against injuries and the optimization of functioning. Conventional interventions such as dietary therapy, lifestyle intervention, and continual constitutional support all deal with organic agents that can predispose to injury recurrence, yet high-quality long-term results data have not been widely obtained. The combination of the two should be promising in the overall prevention of the cause of ankle injuries and the consideration of both mechanical and constitutional causes.

3. Conclusion

The results of this article indicate that Western medicine and traditional Chinese medicine provide fundamentally different but potentially complementary methods for the treatment of ankle joint injuries. In contrast to Traditional Chinese Medicine, which offers beneficial holistic healing approaches, customized treatment plans, and natural therapeutic modalities that promote rather than hinder healing processes, Western medicine excels in acute-phase management through advanced diagnostic capabilities, standardized treatment protocols, and precise surgical interventions. The potential advantages of integrated treatment approaches that combine the holistic recovery enhancement capabilities of TCM with the acute management strengths of Western medicine are strongly supported by the evidence. When compared to either strategy alone, meta-analytic data show that combined protocols produce better results, including higher cure rates, fewer complications, better functional recovery, and quicker healing times. The best integration model seems to include integrated management during recovery phases, when TCM's tailored healing support is most beneficial, and Western medicine leadership during acute phases, when prompt stabilization and accurate intervention are critical. The evidence from recent studies does, however, have important limitations that need to be recognized. Most of the high-quality evidence in favor of integration comes from healthcare systems where TCM is ingrained in the culture and practitioners have received substantial training in both medical traditions. Careful evaluation of practitioner competencies, regulatory frameworks, and patient acceptance factors is necessary to ensure that these findings can be applied to Western healthcare contexts. Furthermore, reproducible treatment

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protocols and standardized research methodologies continue to face difficulties due to the diversity of TCM interventions and customized treatment approaches. Healthcare systems should think about creating integrated ankle injury management protocols that include suitable TCM interventions within evidence-based Western care frameworks, according to the implications for clinical practice. To make sure that combination approaches improve rather than degrade the quality of care, this integration necessitates close attention to patient safety procedures, quality assurance measures, and practitioner training. To complement the endeavour of evidence-based integration policies in different settings of healthcare institutions, the priority of future studies must focus on developing standard integration protocols, conducting broad and multicentric trials and developing cost-effectiveness models.

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