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Whole-Hand Positioning with the Handscupe Ergonomic Hand Rest: Biomechanical Rationale for Conservative and Postoperative Carpal Tunnel Syndrome Management and CRPS Rehabilitation

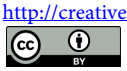
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Abstract

Background: handscupe® is an anatomically shaped medical hand rest that supports the palm, metacarpus, thumb and fingers in a guided resting position. In two product-specific studies in rheumatic hand disease, changes in pain, grip strength, well-being and subjective hand or tendon relaxation were observed during three-week multimodal rehabilitation programs in which handscupe® was used. Because these studies lacked an untreated or sham comparator and included concurrent rehabilitation, the observed improvements cannot be attributed to handscupe® alone. Objective: This conceptual narrative review integrates product-specific evidence with established literature on carpal tunnel biomechanics and complex regional pain syndrome (CRPS) rehabilitation to examine a whole-hand positioning rationale for conservative/preoperative carpal tunnel syndrome (CTS), postoperative recovery after carpal tunnel release, and CRPS rehabilitation. Methods: Relevant literature was identified through targeted PubMed searches, reference chaining and professional-society guidelines. Manufacturer-held product documentation and 46 anonymized patient-related practice-based evaluation forms from seven rehabilitation or therapy settings were reviewed qualitatively; forms were not excluded because they reported no benefit or insufficient exposure. Synthesis: Carpal tunnel pressure is strongly influenced by wrist position and active gripping. This supports a testable hypothesis that whole-hand support may combine favorable wrist positioning with reduced finger-flexor demand during rest. However, the wrist angles produced by handscupe®, flexor muscle activity during use

and intracarpal pressure have not been directly measured. After carpal tunnel release, current evidence does not support routine immobilization; postoperative use of handscupe® is therefore proposed only as a hypothesis of intermittent, non-immobilizing rest between active mobilization periods. In CRPS, graded functional restoration and sensorimotor reintegration are central, and symptom-adapted supported rest is likewise presented as an extrapolated rehabilitation hypothesis rather than an established product-specific effect. Conclusion: Whole-hand positioning provides a coherent biomechanical framework linking the device concept with established CTS and CRPS rehabilitation principles. The current evidence supports clinical plausibility and targeted hypothesis testing, but not indication-specific efficacy claims for CTS, postoperative care or CRPS.

Keywords

Handscupe, Carpal Tunnel Syndrome, Complex Regional Pain Syndrome, Whole-Hand Positioning, Rehabilitation

1. Introduction

The human hand functions as a biomechanical and sensory unit in which wrist position, metacarpal support, finger posture, tendon excursion, muscle activity and sensorimotor control are closely linked. Conditions with very different pathophysiology can therefore produce overlapping functional consequences, including pain, protective posturing, reduced hand opening, swelling, increased muscular or tendinous tension, loss of grip strength and avoidance of active hand use.

handscupe® is a Class I medical hand rest manufactured by iMEDgine GmbH. The current manufacturer documentation describes an ergonomically shaped positioning aid for hands with pathological symptoms. The hand is supported on a three-dimensional surface: individual fingers are placed in finger molds and the central hand is supported by a raised rest mold. The device is available in different sizes and separate left- and right-hand versions [1].

This configuration differs conceptually from a conventional wrist splint. A splint primarily restricts or controls motion at a joint. The handscupe concept instead provides distributed support to the palm, metacarpus, thumb and fingers while allowing the user to lift the hand from the device. The resulting therapeutic idea is therefore not primarily immobilization, but anatomically guided rest of the whole functional unit of the hand.

The purpose of this review is to integrate the product-specific evidence with established carpal tunnel and CRPS literature, and to define a coherent mechanistic rationale for three clinically distinct contexts: conservative or preoperative CTS management, postoperative rehabilitation after carpal tunnel release, and CRPS rehabilitation.

2. Methods: Narrative Review Approach

This article is a conceptual narrative review rather than a systematic review. Literature was identified through targeted searches of PubMed, screening of reference lists from relevant articles, and professional-society or guideline sources. Search concepts included carpal tunnel pressure, wrist position, grip and pinch activity, carpal tunnel splinting, postoperative immobilization after carpal tunnel release, CRPS functional restoration, graded motor imagery, desensitization and rehabilitation. Peer-reviewed human studies, systematic reviews and clinical guidelines were prioritized when available; mechanistic studies were included when they directly informed the proposed biomechanical model. No formal meta-analysis or risk-of-bias scoring was performed.

Conflicting or heterogeneous evidence was retained rather than harmonized into a single effect estimate. When sources differed, greater weight was given to systematic reviews, clinical guidelines and evidence directly relevant to the clinical question, while limitations of smaller or indirect studies were stated in the text. Product-specific evidence consisted of the published exploratory rheumatology study, a follow-up study/manuscript and manufacturer-held practice-based observations. The practice-based archive contained 46 patient-related evaluation forms from seven rehabilitation or therapy settings collected between 2024 and 2026. All 46 patient-related forms were included in the qualitative screening; administrative documents such as invoices were excluded. No form was excluded on the basis of a negative, absent or indeterminate outcome, and no effectiveness rate was calculated because the forms were heterogeneous and were not collected as a controlled study.

3. Device Concept and Biomechanical Principle

The handscupe® paresis technical documentation describes the product as a therapeutic positioning aid for the hand, fingers and forearm. The design is based on an intended physiological hand position, with the fingers guided in dedicated depressions and the central hand resting on a three-dimensional elevation [1]. The product acts through physical contact and geometry; it does not deliver medication, electrical energy or software-based therapy.

From a biomechanical perspective, the effect can be described as a sequence: anatomically shaped support -> distribution of the weight of the hand -> guidance of the fingers and central hand -> reduced need for active holding effort during rest -> a more reproducible resting posture -> potentially lower muscular and tendinous protective tension -> a more favorable starting position for subsequent active movement.

This sequence is intentionally diagnosis-independent at its first levels. The same physical support can have different clinical relevance depending on the disease mechanism. In CTS, the key issue is median-nerve loading within the carpal tunnel; postoperatively, it is the alternation between movement and rest; in CRPS, it is the transition from protective posturing to graded sensory-motor use.

4. Product-Specific Clinical Evidence

4.1. Exploratory Pilot Study in Rheumatic Hand Disease

Marinoska et al. evaluated handscupe® in a prospective exploratory cohort of 30 patients with rheumatic diseases during a three-week inpatient rehabilitation program [2]. The device was used for at least 60 minutes per day. Outcomes included pain, grip strength, hand function, well-being, clinical hand findings, disease activity and imaging-related measures.

The study reported high acceptance, with 97% of participants satisfied with the application. During the multimodal rehabilitation program in which handscupe® was used, improvement in pain intensity was reported in 90% and grip strength increased in 90%, although the magnitude of grip-strength change was highly variable [2]. Because there was no untreated or sham comparator and participants simultaneously received other rehabilitation interventions, these changes cannot be attributed to handscupe® alone. For mechanistic interpretation, the qualitative observations are nevertheless relevant: patients frequently described general relaxation of the hand and reduced tension in tendons or tendon insertions, and some reported a reduction in diffuse tightness or swelling sensation.

Inflammatory imaging and disease-activity measures did not show a parallel, consistent change. This pattern is compatible with, but does not prove, a predominantly functional or biomechanical interpretation rather than a direct anti-inflammatory action. A possible explanation is that external support reduces active holding effort or protective tension, but this mechanism was not directly measured in the study.

4.2. Follow-Up Study

A subsequent study enrolled 32 patients with inflammatory rheumatic disease; 26 completed the intervention and were analyzed [3] [4]. Daily application again occurred within a multimodal three-week rehabilitation program. In paired analyses of the 26 completers, right-hand grip strength increased by a mean of 6.04 kg (95% CI 0.31 to 11.76 kg; paired t-test $t(25) = 2.173$, two-sided $p = 0.039$; Hedges $g = 0.413$). The WHO-5 well-being index increased by a mean of 14.92 points (95% CI 1.35 to 28.50; paired t-test $t(25) = 2.264$, two-sided $p = 0.033$; Hedges $g = 0.431$) [3]. Other broader disease and function measures did not show uniform significant change [3] [4]. As in the pilot study, these within-program changes occurred alongside concurrent rehabilitation and therefore do not isolate a handscupe®-specific treatment effect.

The follow-up data therefore show selective within-program changes rather than an undifferentiated improvement across all measured domains. The design remains exploratory because there was no untreated or sham comparator and the patients received concurrent rehabilitation.

4.3. Practice-Based Observations from Rehabilitation Settings

In addition to the published clinical work, the internal practice-based archive con-

tained 46 anonymized patient-related evaluation forms from seven neurological rehabilitation or occupational-therapy settings collected between 2024 and 2026. All 46 patient-related forms were included in the qualitative review; administrative records were excluded, and no form was excluded because it reported no benefit, no observable change or insufficient exposure. These observations were not generated as a controlled efficacy trial and are therefore used descriptively rather than to estimate treatment effectiveness.

Across the full set of reviewed forms, therapists or users documented themes such as improved hand mobility or hand function, a looser or less tense hand, reduced perceived swelling or a "thinner" feeling of the hand, and easier positioning of fingers. The archive also showed clinical heterogeneity: some patients required assistance when positioning the hand or using the fixation strap, some observations were too brief or indeterminate to support an assessment, and some forms documented no clear benefit. Negative or indeterminate observations were retained in the qualitative synthesis.

The relevance of these data is the recurrence of intermediate functional domains also described in the rheumatology studies—tone, tension, hand position, mobility, pain and swelling sensation—in a different patient population. This pattern is compatible with a diagnosis-independent positioning hypothesis, but the uncontrolled, heterogeneous observations do not demonstrate a causal device effect or a shared clinical outcome across diagnoses.

5. Whole-Hand Positioning as a Mechanistic Framework

Wrist position and finger position cannot be considered independently. The extrinsic finger flexors and extensors cross the wrist, and their length-tension relationships change with wrist and finger configuration. Active gripping also requires coordinated tendon excursion and muscular recruitment across the forearm-hand unit.

The term "whole-hand positioning" is used in this article to describe the product concept in which wrist, metacarpus, thumb and fingers are supported as one biomechanical chain. It is not proposed as an established independent therapy category. Rather, it is a useful framework for explaining how a shaped hand rest may differ from a device that controls only wrist angle.

The proposed intermediate effect is a functional rest window: a period in which the hand is externally supported so that the resting posture does not need to be maintained entirely by active or pathologically increased muscle activity. This window is clinically meaningful only if it facilitates subsequent movement, comfort or function rather than replacing active use.

The proposed mechanism should be interpreted as a biomechanical hypothesis. To date, the actual radiocarpal wrist angle produced by handscupe®, finger-flexor muscle activity during use and intracarpal tunnel pressure during positioning have not been directly measured. The CTS rationale developed below therefore combines the device geometry and observed resting-support concept with established CTS biomechanics; it does not represent a demonstrated device-specific

decompression effect.

6. Carpal Tunnel Syndrome: Biomechanical Rationale

6.1. Carpal Tunnel Pressure and Wrist Position

CTS is a compression neuropathy of the median nerve within the carpal tunnel. In addition to the median nerve, the finger flexor tendons pass through the same confined anatomical space. Intracarpal pressure is therefore highly sensitive to wrist posture and hand activity.

In a classic invasive pressure study, Gelberman et al. measured mean carpal tunnel pressures of approximately 32 mmHg in neutral position, 94 mmHg at 90 degrees of wrist flexion and 110 mmHg at 90 degrees of wrist extension in patients with CTS [5]. These findings established that extreme flexion and extension can substantially increase the mechanical environment acting on the median nerve.

Weiss et al. subsequently determined the wrist position associated with the lowest carpal tunnel pressure. In healthy participants, the mean minimum occurred close to neutral, at approximately 2 degrees of extension and 2 degrees of ulnar deviation; the study also included a small CTS group [6]. Werner et al. likewise found the lowest pressures with the wrist neutral, the hand relaxed with the fingers flexed, and the forearm semi-pronated [7].

Clinical splinting data are consistent with these pressure observations. Burke et al. compared splints positioning the wrist at neutral and at 20 degrees of extension and found superior symptom relief with the neutral-angle splint [8]. Thus, for CTS, a true radiocarpal posture near neutral is more relevant than a generic concept of "functional" wrist extension.

This distinction is important when interpreting the handscupe geometry. Manufacturer documentation describes a sloped rest form; however, the slope of the product surface must not be equated directly with the patient's true radiocarpal extension angle. The resulting wrist position depends on forearm support, hand size, contact geometry and the relationship between the palm and the device [1].

6.2. Finger Activity and Flexor-Tendon Loading

Wrist angle is only one component of the pressure environment. McGorry et al. measured carpal tunnel pressure in vivo in healthy wrists and showed that active pinch or power grip can increase pressure, particularly during motions that include extension [9]. In patients with CTS, Goss and Agee documented substantial pressure rises during active pinch and grip tasks, with very high peaks during maximal grip [10].

These findings are relevant to a whole-hand rest concept because a shaped support does not merely influence wrist position; it also supports the fingers and may reduce the need for sustained active gripping or holding during a rest period. The product-specific reports of tendon or hand relaxation [2] are therefore direction-

ally consistent with established carpal tunnel biomechanics, although they do not themselves constitute a direct pressure measurement.

6.3. Conservative and Preoperative CTS

For mild to moderate CTS managed conservatively, or during a preoperative period, a hypothesized role of handscupe® is to reduce avoidable mechanical loading during selected rest periods. The aim would not be to remove a structural stenosis, but to support a favorable hand configuration and reduce sustained active holding or gripping while the hand is at rest. This remains a mechanistic hypothesis because CTS-specific clinical outcomes and intracarpal pressure have not been measured with the device.

The hypothesis can be summarized in two linked components: (1) guided positioning that may limit unfavorable wrist flexion or extension during rest; and (2) passive support of the fingers that may decrease unnecessary flexor recruitment. Both components require direct device-specific verification. The intended clinical concept is symptom-oriented mechanical unloading during selected rest periods rather than permanent immobilization.

The concept also differs from a conventional night splint. A neutral wrist splint primarily prevents wrist excursion. handscupe® supports the whole hand and can be left voluntarily at any time. These approaches may therefore address overlapping but not identical needs, and direct comparison is an appropriate future research question rather than an assumption of equivalence or superiority.

7. Hypothesis for Postoperative Use after Carpal Tunnel Release

After carpal tunnel release, the therapeutic logic changes because the transverse carpal ligament has been divided and the mechanical constriction has been surgically addressed. No product-specific study of handscupe® after carpal tunnel release is presented in this review. The proposed postoperative use is therefore an extrapolated rehabilitation hypothesis, not an established indication-specific effect. Current evidence does not support routine postoperative immobilization as a means of improving outcomes.

The 2024 American Academy of Orthopaedic Surgeons clinical practice guideline states, with moderate evidence, that postoperative immobilization using a sling or orthosis should not be used routinely after carpal tunnel release [11]. Huemer et al. found no significant functional or neurological advantage of postoperative splinting at three months [12]. A 2024 systematic review and meta-analysis including eight studies and 596 patients similarly found no significant benefit of splinting for pain, symptom severity, functional status, grip strength, pinch strength or two-point discrimination [13].

Accordingly, the postoperative hypothesis should not reproduce a splinting strategy. The proposed rationale is intermittent, voluntary resting support between active mobilization and functional use. The sequence would be: active

movement -> functional use -> supported rest -> renewed active movement. In this model, the product is conceptualized as a rest platform rather than an immobilization device, but this specific postoperative strategy requires clinical testing.

This distinction is also important for safety. The current technical documentation describes use on intact skin and advises discontinuation and medical or therapeutic review in the presence of persistent pain, congestion or swelling [1]. In the immediate postoperative setting, wound status, scar sensitivity, local pressure and the timing of use therefore require clinical judgment. The device should not delay wound care or active mobilization.

8. Hypothesis for CRPS Rehabilitation

8.1. Functional Restoration

CRPS is a complex pain condition that can involve sensory, vasomotor, sudomotor, motor and trophic changes. Contemporary guidelines emphasize that it cannot be reduced to a single peripheral lesion or mechanism [14]. No product-specific study of handscupe® in CRPS is presented in this review; the proposed role is therefore an extrapolated rehabilitation hypothesis derived from general functional-restoration principles and the device's positioning concept.

European standards and current practical guidelines place physical rehabilitation and graded functional restoration at the center of management [14] [15]. The therapeutic direction is progressive re-engagement with sensation, movement, loading and meaningful activity, rather than prolonged disuse or unnecessary immobilization.

This context changes the purpose of supported positioning. In CRPS, a hand rest should not become the endpoint of treatment. As a testable hypothesis, a brief, tolerated resting posture may serve as a transition from pain-related guarding to active hand opening and movement.

8.2. Protective Posturing, Sensory Tolerance and Movement

Pain and allodynia can promote protective muscle activity, reduced hand opening and avoidance of use. A plausible rehabilitation sequence is therefore: controlled contact -> passive support -> reduced active holding effort -> a more relaxed hand posture -> active finger movement -> functional task. The core principle is relaxation to enable movement, not relaxation instead of movement.

The reproducible contact surface may also provide a graded sensory input. This is potentially relevant to desensitization and sensorimotor reintegration, but the application must be symptom-adapted. A contact that is comfortable for one patient can be painful for another, particularly in the presence of allodynia. The hand should never be forced into the device against pain or resistance.

The conceptual relationship to graded motor imagery is indirect. Moseley demonstrated benefit from a sequence involving laterality recognition, imagined movement and mirror therapy in a small randomized trial of long-standing CRPS [16]. Systematic review evidence suggests positive signals for graded motor im-

agery and mirror-based approaches but also emphasizes the generally limited quality of the rehabilitation evidence base [17]. handscupe® is not a graded motor imagery intervention; rather, a supported physical posture could be placed downstream within a broader progression from sensorimotor preparation to actual movement (Table 1).

Table 1. Indication-specific interpretation of the same physical positioning principle.

Clinical context	Primary functional problem	Proposed role of handscupe®	Evidence boundary
Conservative /preoperative CTS	Position- and activity-dependent carpal tunnel loading	Hypothesized whole-hand resting support to favor a near-neutral wrist and reduce unnecessary finger-flexor activity during selected rest periods	Mechanism inferred from external CTS biomechanics; device-specific wrist angle, flexor activity and carpal tunnel pressure have not been measured; not a substitute for indicated decompression
After carpal tunnel release	Protective posturing and graded return to function	Hypothesized intermittent non-immobilizing rest between active mobilization and hand use	No product-specific postoperative study; must not reproduce routine splinting or interfere with wound care
CRPS	Pain-related guarding, altered sensory processing and reduced use	Hypothesized symptom-adapted supported rest as a bridge to hand opening, movement and sensorimotor reintegration	No product-specific CRPS study; no forced positioning; tolerance and allodynia determine use
Neurological /rheumatic hand dysfunction	Abnormal tone, pain, reduced mobility or active holding effort	Anatomical support with observed changes in functional domains during multimodal or practice-based care	Causal attribution is limited by uncontrolled designs, concurrent rehabilitation and heterogeneous observations

9. Safety and Current Product Context

The current EU declaration of conformity describes handscupe® as a Class I, non-sterile medical hand rest without a measuring function, intended for positioning hands with pathological symptoms [18]. The current manufacturer risk-management report concludes that the overall residual risk for the established product use is acceptable and that the benefit-risk relationship is positive [19]. An addendum to the clinical evaluation reported no reportable serious incidents and no new critical risks identified through post-market surveillance, literature review and risk-management updates up to July 2025 [20].

These documents relate to the currently established product framework and should not be interpreted as disease-specific clinical proof for CTS or CRPS. They are nevertheless relevant to the general safety context of an external, passive positioning aid. Correct size selection, comfortable finger placement and cessation of use in the event of persistent pain, swelling or congestion remain central practical precautions [1].

10. Research Perspectives

The combined clinical, practice-based and biomechanical evidence generates sev-

eral focused research opportunities. Particularly informative studies would quantify the intermediate mechanisms that define whole-hand positioning and test the indication-specific hypotheses described above.

10.1. Muscle Activity and Relaxation

Surface electromyography of finger flexors, finger extensors and relevant wrist muscles could determine whether the subjective and therapist-observed relaxation reported in product-specific studies is accompanied by measurable reductions in resting muscle activity. Such data would characterize a core mechanism that may be relevant across rheumatic, neurological, CTS and postoperative populations.

10.2. Three-Dimensional Hand Kinematics

A kinematic study should quantify true radiocarpal flexion/extension, radial-ulnar deviation, metacarpophalangeal angles, interphalangeal angles, thumb position and forearm rotation during unsupported rest, handscupe® positioning and a conventional neutral CTS splint. This would resolve the distinction between the device surface inclination and the actual anatomical wrist angle.

10.3. CTS Comparative Outcomes

A clinical comparison between handscupe® and a standard neutral wrist splint could assess the Boston Carpal Tunnel Questionnaire, nocturnal paresthesia, night waking, pain, grip and pinch strength, comfort, adherence and actual daily use. Comfort and adherence are particularly relevant because any conservative positioning strategy depends on regular patient use.

10.4. Ultrasound and Contact-Pressure Mapping

Median-nerve ultrasound, tendon motion and contact-pressure mapping could connect product geometry with local anatomy and surface loading. A combined protocol could relate wrist and finger position, muscle activity, median-nerve cross-sectional area or mobility, symptom change and pressure distribution across the hand rest.

10.5. Postoperative Functional-Rest Strategy

A postoperative trial should compare standard early mobilization with standard early mobilization plus intermittent supported rest. Relevant outcomes include pain, swelling, finger range of motion, grip strength, comfort, patient-reported function and time to normal activities. This design tests the intended "rest between movement" role without reintroducing immobilization.

10.6. CRPS: Immediate Transition from Rest to Active Function

For CRPS, an especially informative feasibility study would ask whether a short, tolerated resting period improves the immediately subsequent capacity for active

hand opening or task performance. Pain, allodynia, hand volume, active finger extension, movement amplitude and willingness to move could be measured before and after the positioning period. This places the intervention within functional restoration rather than passive treatment.

10.7. Responder Characteristics

The heterogeneity of the practice-based observations suggests that response may depend on baseline tone, degree of finger flexion, residual voluntary movement, pain, swelling, hand size, diagnosis and tolerance of the resting posture. Identifying responder profiles could ultimately support a more individualized selection of positioning strategies.

11. Discussion

The most coherent interpretation of handscupe® is not that of a conventional immobilizing orthosis, but of an anatomically structured support for the whole hand. This distinction links the product-specific observations with established disease mechanisms without assuming that the same clinical outcome will occur across diagnoses.

In rheumatic hand disease, changes in pain, grip strength, well-being and perceived tendon or hand relaxation were observed during multimodal rehabilitation programs that included handscupe® [2]-[4]. The uncontrolled designs do not permit attribution of these changes to the device alone. In neurological practice-based observations, similar intermediate themes include reduced tension, improved mobility or function and altered hand posture, again without controlled causal inference. Taken together, these findings are compatible with a plausible intermediate hypothesis that external anatomical support may reduce the amount of active or pathologically maintained effort required to hold the hand at rest.

For CTS, this hypothesis intersects directly with known pressure-dependent pathophysiology. Wrist position near neutral minimizes carpal tunnel pressure relative to extremes of flexion and extension [5]-[8], and active gripping can markedly increase tunnel pressure [9] [10]. Whole-hand positioning therefore provides a testable rationale for simultaneously addressing wrist posture and finger-flexor demand during rest, but the device-specific effects on wrist angle, flexor activity and carpal tunnel pressure remain unmeasured.

After carpal tunnel release, the proposed use should be interpreted as a hypothesis extrapolated from the device's non-immobilizing design and from postoperative evidence showing no routine benefit of immobilization [11]-[13]. It is not supported by a product-specific postoperative trial. Likewise, the proposed CRPS role is extrapolated from functional-restoration principles [14]-[17] and has not been tested in a product-specific CRPS cohort.

This disease-specific interpretation is important for both clinical communication and future research. The primary physical action of the device may be stable across populations, while the therapeutic target is defined by the underlying con-

dition.

This review has several limitations. It is narrative rather than systematic, and no formal risk-of-bias assessment or meta-analysis was performed. Product-specific evidence derives from small uncontrolled cohorts embedded in multimodal rehabilitation and from manufacturer-held, heterogeneous practice-based observations. The actual wrist angle created by the device, finger-flexor muscle activity and intracarpal tunnel pressure have not been directly measured. No product-specific clinical study in conservative CTS, after carpal tunnel release or in CRPS is presented. Accordingly, the CTS, postoperative and CRPS sections should be read as mechanistically grounded, clinically testable hypotheses rather than evidence of indication-specific efficacy.

12. Conclusions

handscupe® can be conceptualized as an anatomically defined biomechanical rest platform for the whole hand. Its three-dimensional geometry supports the palm, central hand, thumb and fingers. In product-specific rheumatology cohorts, changes in pain, grip strength, well-being and subjective relaxation were observed during multimodal rehabilitation programs in which handscupe® was one component; these changes cannot be attributed to the device alone. The 46 practice-based evaluation forms reviewed here describe overlapping functional domains such as tone, tension, mobility, pain, swelling sensation and hand position, but the uncontrolled observations are descriptive rather than evidence of efficacy.

For conservative or preoperative CTS, established biomechanics provide a plausible rationale because carpal tunnel pressure is strongly influenced by wrist position and active hand use. However, handscupe®-specific wrist angle, flexor activity, intracarpal pressure and CTS clinical outcomes have not been measured, so a decompressive or symptom-relieving device effect cannot be assumed. After carpal tunnel release, intermittent supported rest is proposed as a non-immobilizing rehabilitation hypothesis rather than an established postoperative indication. In CRPS, symptom-adapted supported rest is likewise an extrapolated hypothesis intended to facilitate, not replace, active sensorimotor rehabilitation.

Across these contexts, the unifying concept is a functional rest window: external anatomical support may create a temporary low-demand hand posture from which active movement and functional rehabilitation can resume. The concept is mechanistically coherent and clinically testable, but indication-specific efficacy remains to be established. The framework provides a rationale for targeted studies using electromyography, three-dimensional kinematics, pressure mapping, CTS-specific clinical outcomes and CRPS functional measures.

Ethics and Data Context

This manuscript is a narrative review and mechanistic synthesis. The manufacturer-held archive used for the practice-based section contained anonymized evaluation forms; no identifiable patient-level data were extracted or presented in this

article. The manufacturer's application-observation cooperation framework specifies written patient consent, anonymized data handling and compliance with ethical standards. The present review did not introduce a new patient intervention; the practice-based material is reported only as a qualitative description of previously collected observations.

Conflicts of Interest

Julie Kux is employed part-time by iMEDgine GmbH, the manufacturer of handscupe®, and serves as Managing Director, Site Manager and Lead Physiotherapist at 4SALUD GmbH. iMEDgine GmbH provided manufacturer documentation, access to anonymized practice-based evaluation forms and information on product-specific clinical studies. iMEDgine personnel were involved in defining the manuscript concept and in factual review of product-specific descriptions. The corresponding author accepts responsibility for the scientific interpretation, the final manuscript and the decision to submit. These relationships should be considered when interpreting the product-specific evidence discussed in this review.

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