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ORIGINAL ARTICLE

Effect of somatosensory pain rehabilitation in 153 patients with foot complex regional pain syndrome: retrospective cohort study

Efeito da reabilitação somatossensorial da dor em 153 pacientes com síndrome da dor complexa regional do pé: estudo de coorte retrospectivo

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The data that support the findings of this study are available from the corresponding author upon reasonable request.

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ABSTRACT

BACKGROUND AND OBJECTIVES: Complex regional pain syndrome (CRPS) is a pain condition that presents with tactile hypoaesthesia or paradoxical painful touch-evoked tactile hypoaesthesia – Static Mechanical Allodynia (SMA). There is no data on the efficacy of somatosensory interventions for CRPS of the foot. The aim of the study was to evaluate in clinical practice the efficacy of the method of Somatosensory Pain Rehabilitation (SPR) in patients with CRPS of the foot.

METHODS: This retrospective cohort study included patients with foot CRPS treated with SPR. Two therapeutic approaches were used. Group A: Patients with hypoaesthesia underwent aesthesiography and were given an at-home somatosensory re-learning intervention. Hypoaesthetic was quantified using the Pressure Perception Threshold (PPT) and static 2-Point Discrimination Test (2PDT). Group B: Patients with SMA underwent allodynography and were given at-home interventions to not touch painful territories and Distant Tactile Counter-Stimulation. Once SMA disappeared, the underlying tactile hypoaesthesia was evaluated with PPT, 2PDT. Painful symptoms were measured with the McGill Pain Questionnaire (MPQ). Repeated-measures ANOVA was used to assess SPR effects on pain and hypoaesthesia, with effect sizes calculated.

RESULTS: A total of 153 patients were included (Group A: n=45; Group B: n=108). Mean treatment duration was 6.4 months. In Group B, 79.6% (n=86) experienced SMA resolution. Both groups showed significant post-treatment improvements in PPT, 2PDT and MPQ scores ($p<0.001$), with large effect sizes.

CONCLUSION: The SPR method, a tailored somatosensory-based intervention guided by individual somatosensory profiles, demonstrated significant improvements in pain and tactile sensibility in patients with CRPS of the foot.

KEYWORDS: Allodynia, Complex regional pain syndromes, Hypesthesia, Neuralgia.

RESUMO

JUSTIFICATIVA E OBJETIVOS: A síndrome dolorosa regional complexa (SDRC) pode apresentar hipoestesia tátil ou hipoestesia tátil paradoxalmente dolorosa evocada pelo toque - Alodínia Mecânica Estática (AME). Não há dados sobre a eficácia de intervenções somatossensoriais para SDRC do pé. Este estudo avaliou, na prática clínica, a eficácia do método de Reeducação Somatossensorial da Dor (RSD) em pacientes com SDRC do pé.

MÉTODOS: Estudo de coorte retrospectivo com pacientes tratados pelo método RSD. Dois manejos terapêuticos foram utilizados. Grupo A: pacientes com hipoestesia realizaram estesiografia e um programa domiciliar de reaprendizagem somatossensorial; a hipoestesia foi quantificada pelo Limiar de Percepção de Pressão (PPT) e pelo Teste Estático de Discriminação de Dois Pontos (2PDT). Grupo B: pacientes com AME realizaram alodiniografia e receberam orientações para evitar o toque no território doloroso e realizar contraestimulação tátil à distância. Após resolução da AME, a hipoestesia subjacente foi avaliada usando o PPT e o 2PDT. A dor foi medida pelo Questionário de Dor McGill (MPQ). Os efeitos do método foram analisados por ANOVA de medidas repetidas, com cálculo de tamanhos de efeito.

RESULTADOS: Foram incluídos 153 pacientes (Grupo A: n=45; Grupo B: n=108), com duração média do tratamento de 6,4 meses. No Grupo B, 79,6% (n=86) apresentaram resolução da AME. Ambos os grupos apresentaram melhorias significativas em PPT, 2PDT e MPQ após a intervenção ($p<0{,}001$), com tamanhos de efeitos altos.

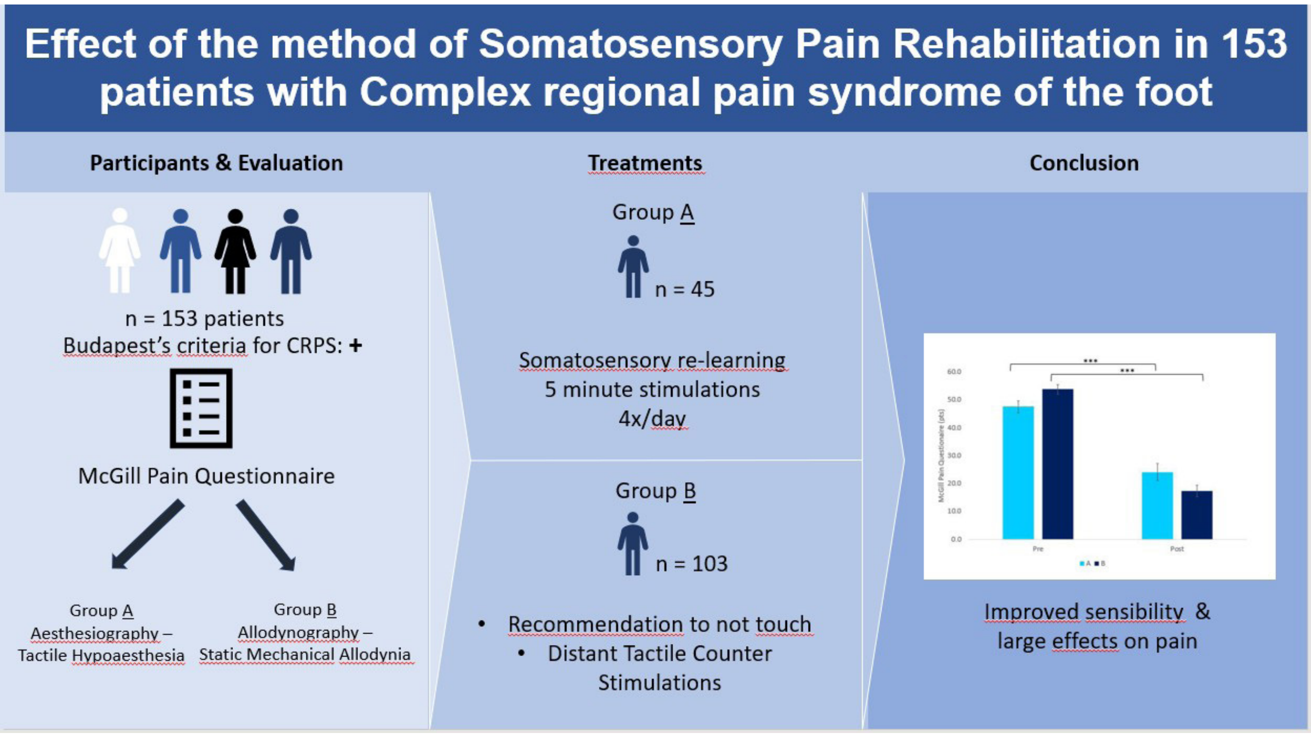
CONCLUSÃO: O método RSD, uma intervenção somatossensorial personalizada guiada pelo perfil somatossensorial, demonstrou melhorias significativas na dor e na sensibilidade tátil em pacientes com SDRC do pé.

DESCRITORES: Alodínia, Dor neuropática, Hipoestesia, Síndrome dolorosa complexa regional.

HIGHLIGHTS

- Somatosensory rehabilitation significantly reduces pain in lower limb CRPS
- Somatosensory Pain Rehabilitation (SPR) reduces tactile hypoaesthesia
- Further research is needed on the relationship between CRPS and somatosensory disorder

GRAPHICAL ABSTRACT



INTRODUCTION

Complex regional pain syndrome (CRPS) is characterized by persistent pain and a constellation of somatosensory, vasomotor, sudomotor, and trophic dysfunctions which cannot be directly explained by the initial trauma[1,2]. Pain, often described as "boiling" or "freezing" within the affected joint[3], has been identified as CRPS' most important symptom[1]. Patients may report body perception disturbances such as sensations of stiffness or difficulty initiating movement[4,5]. CRPS can present with Static Mechanical Allodynia[1,6] (SMA), a common neuropathic pain feature defined as pain caused by a static "stimulus that does not normally provoke pain"[7,8]. The addition of SMA in CRPS has been found to add complexity to the care and treatment of CRPS[9]. Recent research suggests *somato*sensory-based interventions may decrease CRPS and SMA symptoms[10,11]. An integrative review on the efficacy of physical, cognitive, and occupational treatments for upper limb CRPS revealed that most interventions addressed sensory deficits[11]. These findings echo the results of a study on a large database of patients diagnosed with peripheral neuropathic pain; it suggested that patterns of *somato*sensory abnormalities reflect underlying pain mechanisms and can help predict treatment responses[10,12].

Research on the pathophysiology and treatment of CRPS and its neuropathic features remains limited, and the condition remains poorly understood[12-14]. Findings suggest that CRPS probably has multiple etiologies, including maladaptive inflammatory and neurological responses which might underlie its constellation of symptoms[1,14]. While treatment of upper extremity CRPS has been studied by many research groups, little research has been conducted on lower extremity CRPS and its treatment[15]; that is possibly given the lower incidence of lower extremity CRPS[16,17]. However, other authors have suggested the foot is susceptible to CRPS with features of allodynia because of the high density of sensory fibers in non-glabrous skin in this region[18]. A recent retrospective analysis was performed on a subgroup of this study's cohort: 86 patients with CRPS of the foot with SMA[19]. The authors identified SMA as a paradoxical condition marked by painful touch-evoked sensations alongside signs of tactile hypoesthesia. The method of Somatosensory Pain Rehabilitation (SPR)[3,20] was found to have a positive effect in SMA resolution[19]. Interestingly, they observed tactile hypoesthesia reduction in parallel to CRPS symptom reduction, suggesting a *somato*sensory nervous system contribution to development or maintenance of CRPS. However, to the best of the authors' knowledge, there is no current research on the effect of *somato*sensory-based interventions for CRPS of the foot.

The purpose of the study was to evaluate the effect of the method of SPR in reducing pain in patients with CRPS of the foot. The specific research questions were: a) does the method of SPR reduce pain in persons with CRPS of the foot? b) Does the method of SPR improve tactile hypoesthesia? The primary outcome of the study was changes in McGill Pain Questionnaire (MPQ) score, representing pain reduction. Secondary outcomes were change in Pressure Perception Threshold (PPT) and the static 2 Point-Discrimination Test (2PDT), representing tactile hypoaesthesia improvement.

METHODS

This was a retrospective cohort study of patients receiving SPR at the Somatosensory Rehabilitation Center (Fribourg, Switzerland) between July 1st, 2004, and February 13th, 2020. Clinical data were collected by two Certified Somatosensory Therapists of Pain (CSTP®, obtained after 150 hours of specialized training). Reason for referral was suspicion of neuropathic pain post conservative intervention or post elective/urgent surgery of the foot from an undetermined etiology (traumatic, compressive, psychosomatic, metabolic, infectious, or biochemical). The inclusion criterion was having a confirmed diagnosis of CRPS of at least one foot (ankle or metatarsophalangeal joints) based on the Budapest's criteria[21].Exclusion criteria were having any other neurological pain condition.

Ethics approval was obtained by the Human Research Ethics committee of the Centro-Oeste State University (Opinion 5.953.512). All participants provided written consent for assessment, treatment, and use of their anonymized data in research.

Method of somatosensory pain rehabilitation: assessment

[For more detail on the assessment and intervention of the method of SPR, refer to Supplementary Material Timeline]. At the initial assessment, the therapist screened and confirmed a CRPS of the foot using Budapest's criteria[21]. Therapists administered the culturally validated McGill Pain Questionnaire adapted for Brazil (Br-MPQ - Questionário de dor McGill Adaptado para o Brasil[22]), when possible, in patient's native language, to evaluate the quality and intensity of painful symptoms[23-26]. The original MPQ has strong evidence for reliability and validity[23]. The therapists formed a clinical anatomy hypothesis of the involved cutaneous nerve branch based on the location of painful symptoms.[27] The MPQ was readministered monthly to monitor pain evolution.

Patients were allocated into two groups based on the decision-making algorithm of the SPR method (Figure. 1) developed for diverse neuropathic pain conditions[19,20]: Group A for patients presenting with CRPS of the foot with tactile hypoaesthesia and Group B for patients with CRPS of the foot with SMA.

Two treatment approaches: Type A = rehabilitation of hyposensitivity and Type B = treatment of Static Mechanical Allodynia (SMA) and subsequent treatment of the underlying tactile hypoesthesia.

In both groups, patients were instructed to avoid painful mobilization only of the affected joint, when possible, to avoid CRPS symptom exacerbation[1,19,20]. All at-home tactile stimulation interventions – described in the following section – were completed prior to 4:00 PM, as pain associated with CRPS typically worsens throughout the day[20,28]. Patients attended weekly sessions for assessments and for routinely follow-up of their adherence to the therapeutic recommendations.

Group A - Therapeutic management type A

Therapists implemented therapeutic management Type A (Figure 1) to address the tactile hypoaesthesia. The therapist performed an aesthesiography to outline the territory where tactile stimuli above the normal perceptual threshold was not detected[27]. To quantify the hyposensitivity, the therapists performed two assessments: The Pressure Perception Threshold[3,29] (PPT) measures threshold detection: the therapist applied monofilaments in the territory outlined by the aesthesiography in Ascending (A) order and recorded the first filament the patient detected. Then, monofilaments were applied in Descending (D) order, recording the last filament detected. The PPT score was calculated by finding the average of the detected monofilaments during 6 series: ADADAD[30,31]. The static 2-Point Discrimination Test (2PDT) was administered to evaluate discriminative ability[30,32-34]. A 2-point caliper was applied in the hypoaesthetic territory for 2 seconds during which the patient identified whether they perceived one or two points[35]. The distance between the two points were progressively reduced if the patient correctly distinguished between one or two points. PPT and 2PDT were re-evaluated weekly and alternately.

Patients were instructed to implement Intervention A: a *somato*sensory re-learning at-home program to rehabilitate the hypoaesthetic territory. Patients directly stimulated the hypoaesthetic skin to focus on the perceptual experience of different textures of their choice and compared it to an area of normal sensation to stimulate mechanisms of adaptive neuroplasticity[3,36-39]. This was completed for 5 minute sessions 4 times daily until normalization of the hypoaesthetic territory.

Group B - Therapeutic management type B

If patients reported allodynic symptoms, the clinician utilized therapeutic management type B (Figure 1)[19,30,40]. The CSTP® administered two clinical examinations to elicit signs supporting the identification of SMA. Allodynography, a standardized and reliable clinical examination researched in those with CRPS[41], mapped the extent of allodynia[6]: the cutaneous territory where the application of 15-gram force (gf) monofilament generates a painful response of "STOP". "STOP" is the pain invariant and is defined as pain at rest + 1cm on the Visual Analogue Scale[9]. The allodynography was reassessed monthly.

To qualify the severity of the allodynic territory, the therapist employed the Rainbow Pain Scale (RPS), an objective clinical examination[42]: it ranges from red to purple with each color corresponding to a monofilament of different thickness, and thus SMA severity. The territory of the RPS was reassessed weekly.

To treat the SMA, patients were instructed to implement Intervention B1: a) to not touch, when possible, the painful territory and b) Distant Tactile Counter-Stimulation (DTCS) consisting of comfortable tactile stimulation applied 8 times a day for one minute in a neuroanatomically related territory with normal sensibility[20,30,43]. Intervention B1 was pursued daily until the allodynography became negative: the application of 15 gf no longer elicited a painful response.

Once the SMA had resolved, the CSTP® confirmed the presence of an underlying tactile hypoaesthesia by performing an underlying aesthesiography which follows the same administration as an aesthesiography. Weekly and alternately, the clinicians quantified the importance of the underlying hypoaesthesia by performing the short form Pressure Perception Threshold (PPT_s) and the short form 2-point discrimination test ($2PDT_s$)[43].The short forms were used to minimize the risk of SMA relapse by preventing tactile over stimulation on the previously allodynic territory[20], as it is not recommended to perform the 2PDT in allodynic territory[44].

To treat the underlying hypoaesthesia, patients implemented Intervention B2: 1) To not touch the previously allodynic territory to prevent SMA relapse, 2) continued DTCS, and 3) a progressive somatosensory re-learning program. Patients re-learned how to perceive tactile stimuli daily by stimulating the hypoaesthetic territory for short durations, starting at 15 seconds 8 times a day for the first week. Once shorter durations were tolerated, the duration of the exercises progressively increased (week two: 30 seconds 8 times/day, week three: 1 minute 6 times/day, week four: 3 minutes 4 times/day, week five: 5 minutes 4 times/day). Participants continued 5 minutes stimulation 4 times a day until normalization of the underlying hypoaesthetic territory. For both treatment approaches, treatment termination occurred once results of the 2PDT and PPT reached normative results.

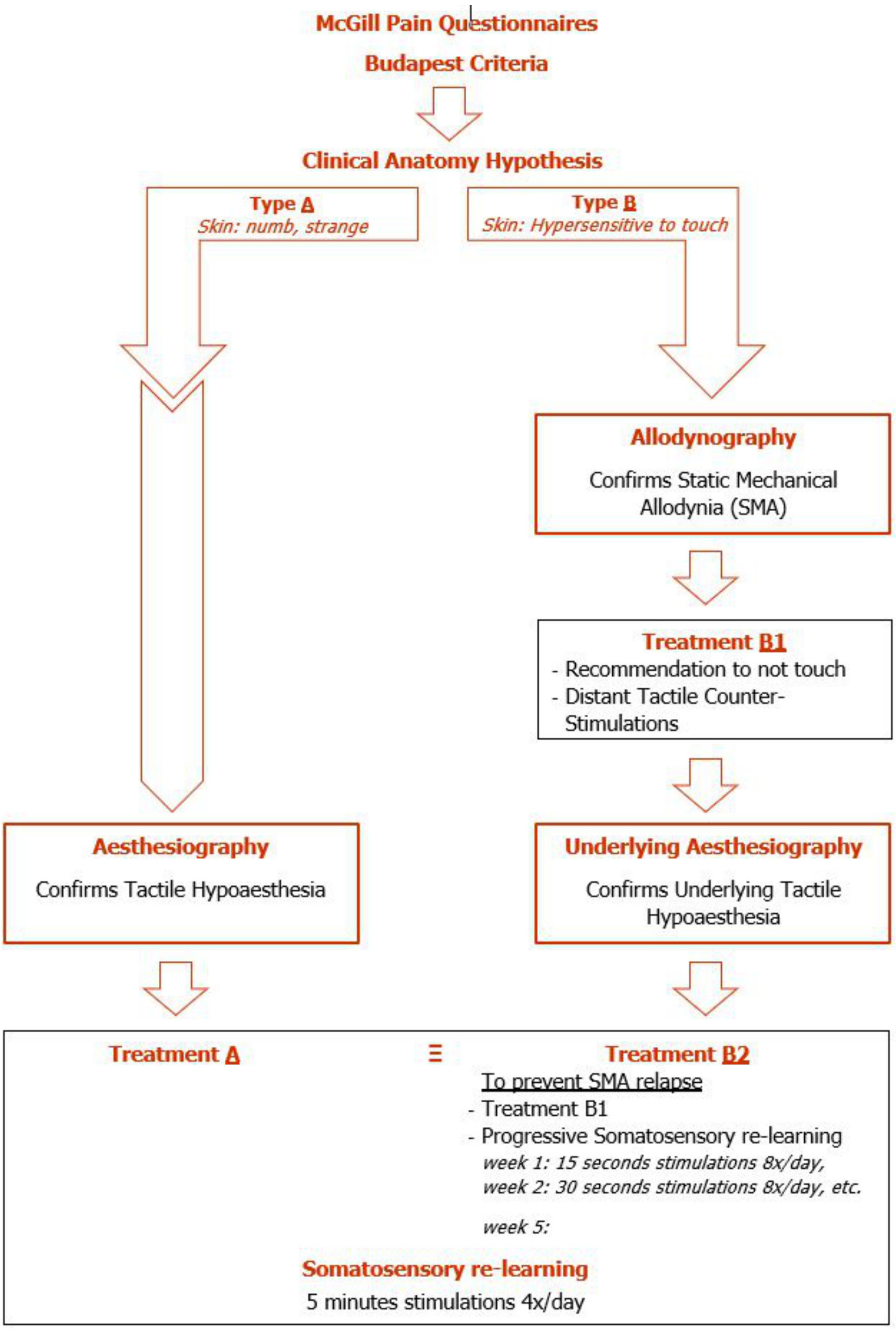


Figure 1. Decision-making algorithm of the method of Somatosensory Pain Rehabilitation.

Statistical analysis

Data were analyzed according to their distribution and were presented in terms of central tendency and dispersion (mean ± SEM or median [25th to 75th quartiles]). There was no missing data. For the comparisons between baseline characteristics of group A and group B as continuous variables parametric or nonparametric tests were used after testing for normality. To evaluate the efficacy of the SPR method with regards to the continuous variables, within both groups and between intervention groups, a repeated measures ANOVA was performed. Between-group comparisons were included to determine whether the SPR method produced differential effects according to the initial allocation, allowing us to verify whether changes over time were specific to each intervention group rather than reflecting general time-related improvements. The dependent variable in this test was pain intensity (MPQ) or importance of tactile hypoaesthesia (PPT, 2PDT) and the main factors were Group (Group A vs. Group B) and Time (at baseline and after treatment). In the repeated measures ANOVA, the F-value indicates the ratio between the variance explained by the factors (Group and Time) and the error variance[45]. Higher F-values suggest that the factor has a significant effect on the dependent variable, with larger values indicating a stronger effect. For the assessment of within group change, a 2-sided paired sample *t* test (95% confidence intervals) was performed with each of the continuous variables and with time as the main factor. Effect sizes were calculated, estimated by Cohen's d, and considered 0.2 as small, 0.5 as medium, 0.8 as large and over 1.0 as very large[46]. Data analysis was performed using the Statistical Package SPSS (version 21.0).

RESULTS

158 patients with CRPS of the foot were screened. Five patients with an associated neurological pain diagnosis (e.g., spine-related leg pain) were excluded (Figure 2). All analyses were done for the cohort of 153 patients (mean age, 46.7±15.0 years). There were more females represented (n=118, 77.1%) in the cohort.

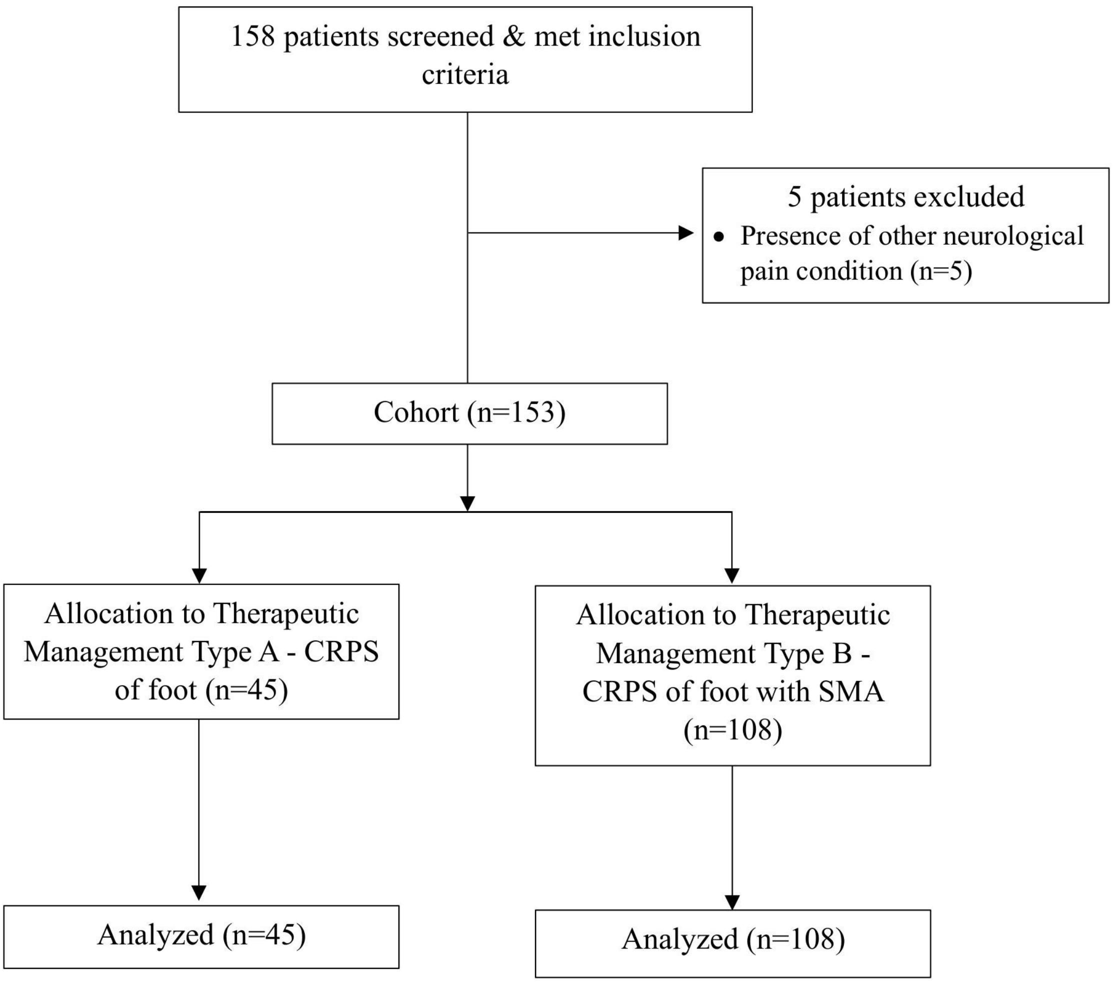


Figure 2. Flowchart of the cohort. CRPS = Complex regional pain syndrome; SMA = static mechanical allodynia.

At initial assessment, average chronicity of painful symptoms was 19.1 months. Mean treatment duration for the cohort was 6.4 (±5.0) months.

45 patients (29.4%; aged 50.1±13.4 years; 37 women) with CRPS with evidence of tactile hypoaesthesia underwent treatment approach A (Group A). In this group, the mean PPT of the hypoaesthesia was 2.7±2.2 gf before intervention. Their mean treatment duration was 4.2 (±3.6) months. Group B consisted of 108 patients (70.6%; aged 45.1±15.5 years; 82 females) with identifiable SMA in addition to CRPS. 22 of them (20.4%) did not see resolution of the SMAs. 86 (79.6%) patients with SMA features in CRPS were successfully resolved and shifted into an underlying tactile hypoaesthesia after 8.5±7.5 months of treatment. In the 86 patients with resolved SMA, the mean PPT of the underlying hypoaesthesia was 2.9 (median, 1.4) gf.

The primary research question examined whether SPR reduced pain in individuals with CRPS of the foot. Statistical analysis revealed a significant effect of intervention (F=286.68; p<0.001) and groups (F=14.18; p<0.001) (Figure 3) on MPQ. Group A presented with a 49.2% mean reduction in MPQ score and Group B, 67.7%. The effect size (*d*) from this ANOVA was 3.06.

Comparison between the McGill Pain Questionnaire before and after the method of Somatosensory Pain Rehabilitation's assessment and treatment between group A = Complex regional pain syndrome (CRPS) with tactile hypoesthesia and group B = CRPS with paradoxical touch-evoked painful tactile hypoesthesia (static mechanical allodynia) *** p>0.001. MPQ scores are presented as mean values with their respective standard errors of the mean (SEM) to illustrate central tendency and dispersion.

The secondary specific research question examined whether SPR improved tactile hypoaesthesia. Statistical analysis revealed a significant effect of intervention (F=214.20; p<0.001) on PPT with no difference between groups (F=0.31; p=0.580) on PPT (Figure 4). Group A had a 66.2% mean reduction in PPT score, similar to Group B who had a 70.4% reduction. The effect size (*d*) from this ANOVA was 2.52. Statistical analysis revealed a significant effect of intervention (F=35.69; p<0.001) and groups (F=0.40; p=0.84) on 2PDT (Figure 5) presented no significant difference between groups. The effect size (*d*) from this ANOVA was 1.03.

Comparison between the Pressure Perception Threshold before and after the method of Somatosensory Pain Rehabilitation's assessment and treatment between group A = Complex regional pain syndrome (CRPS) with tactile hypoaesthesia and group B = CRPS with paradoxical touch-evoked painful tactile hypoaesthesia (static mechanical allodynia) *** p>0.001. PPT are presented as mean values with their respective standard errors of the mean (SEM) to illustrate central tendency and dispersion.

Comparison between the static Two-Point Discrimination Test before and after the method of Somatosensory Pain Rehabilitation's assessment and treatment between group A = Complex regional pain syndrome (CRPS) with tactile hypoesthesia and group B = CRPS with paradoxical touch-evoked painful tactile hypoesthesia (static mechanical allodynia) *** p>0.001. 2PDT are presented as mean values with their respective standard errors of the mean (SEM) to illustrate central tendency and dispersion.

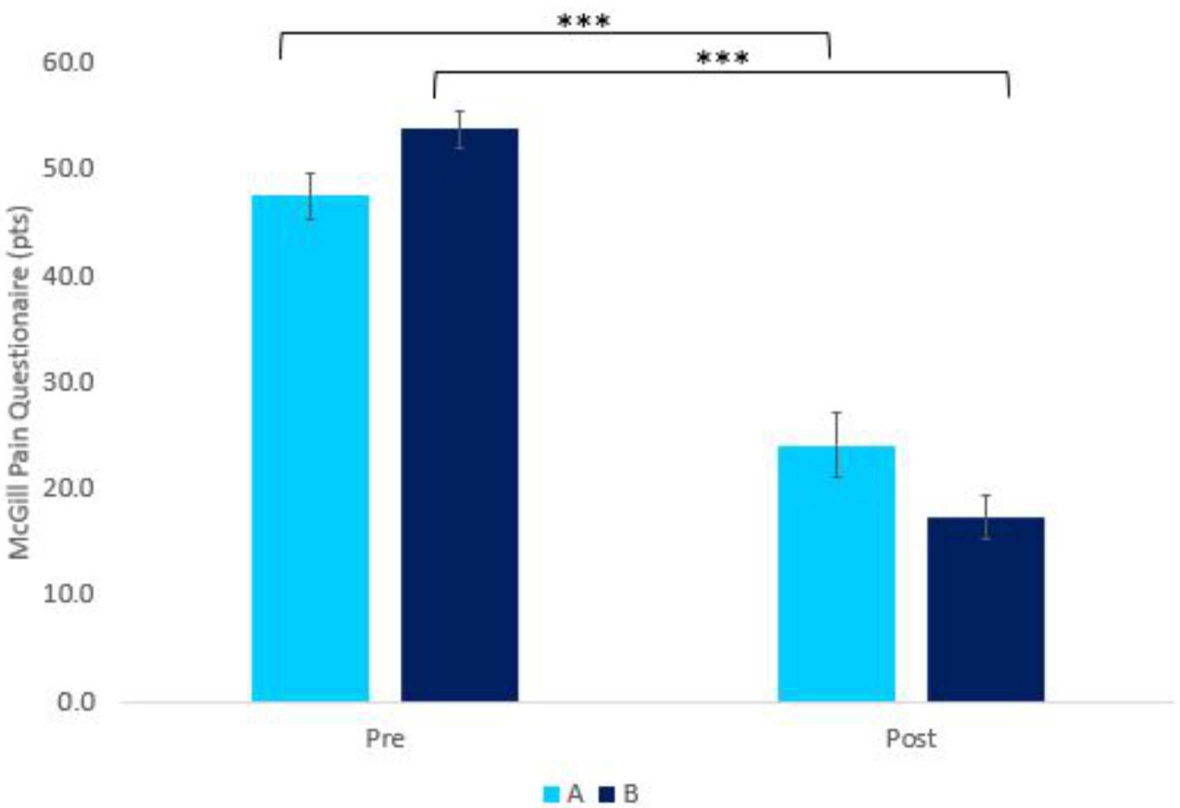


Figure 3. McGill Pain Questionnaire score pre and post intervention.

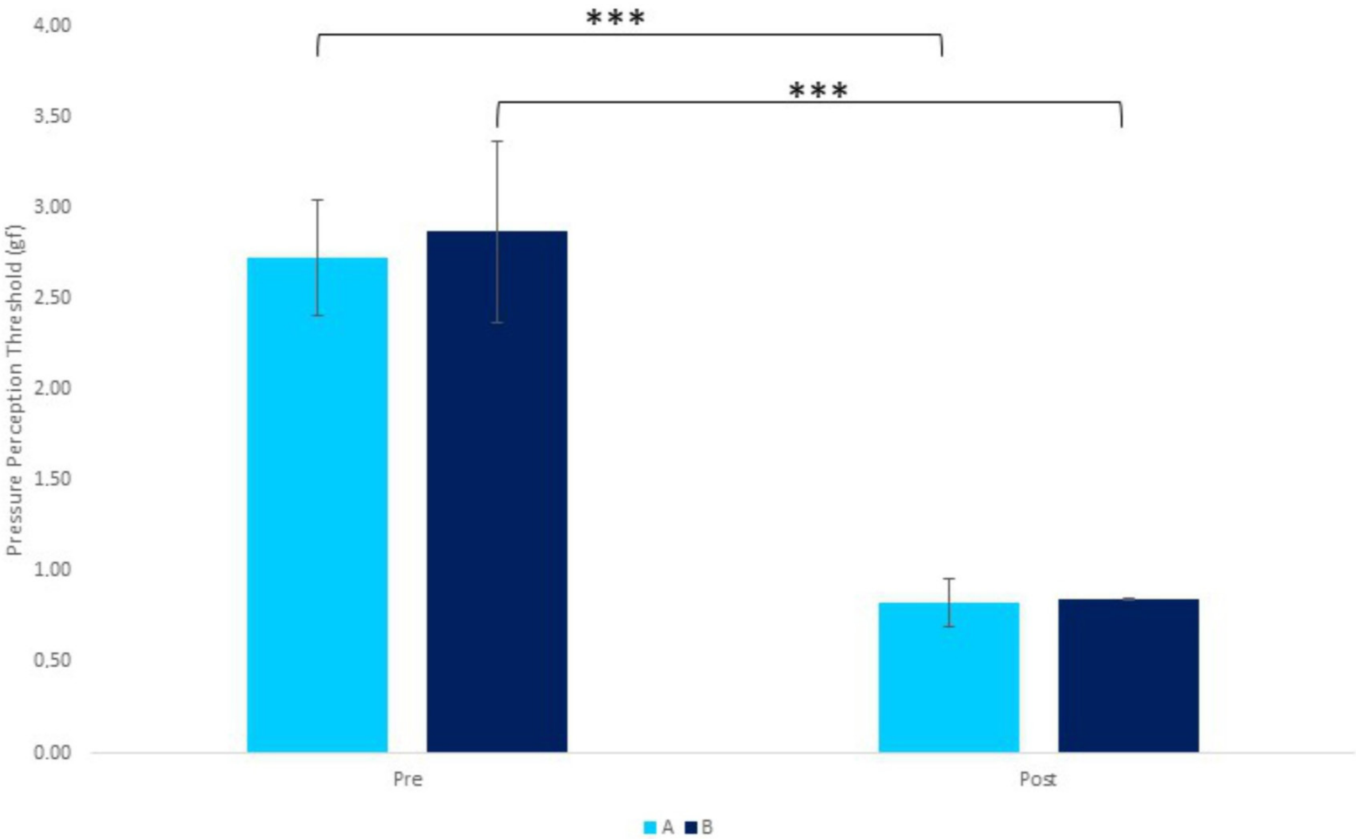


Figure 4. Pressure perception threshold score pre and post intervention.

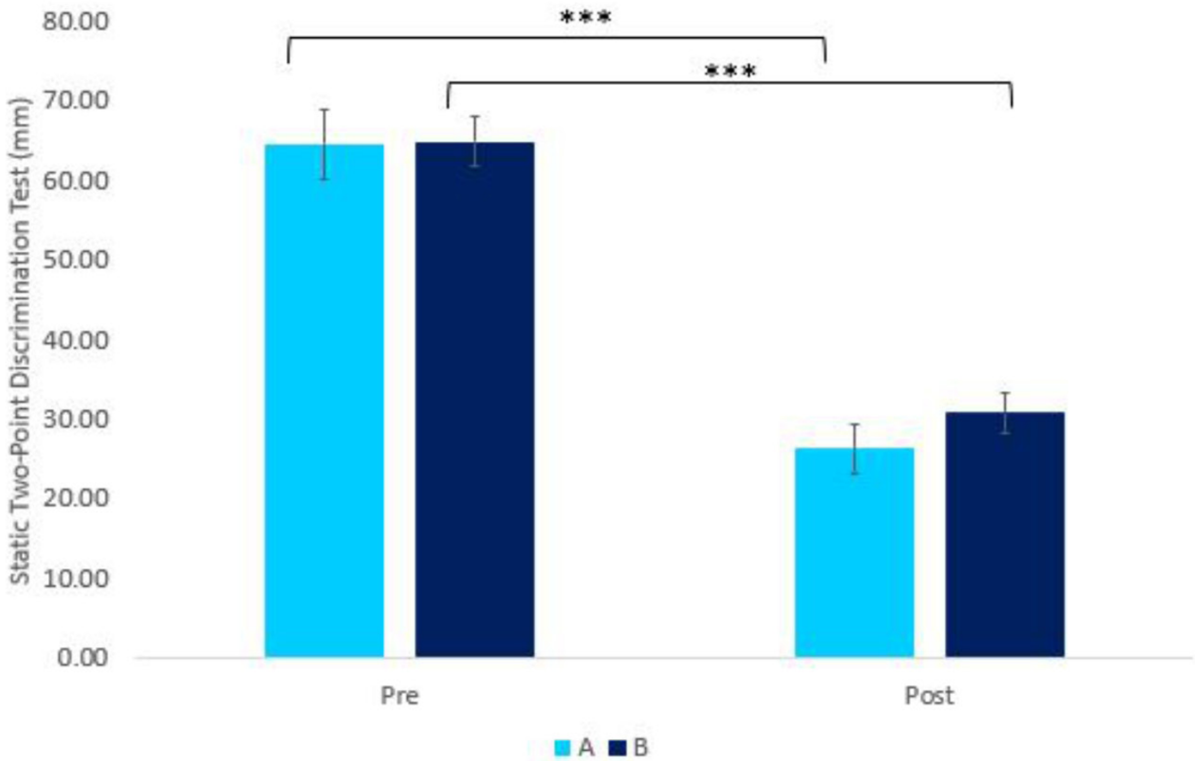


Figure 5. Two-Point Discrimination Test score pre and post intervention.

DISCUSSION

The present study, whose sample contained 153 patients, confirmed that the method of SPR had large effects on reducing pain and importance of tactile hypoaesthesia in those with CRPS of the foot (Group A) and in those with CRPS of the foot with SMA (Group B). Post tailored intervention (Figure 1), both patient groups experienced a statistically significant improvement (p<0.001) in their MPQ scores, representing a decrease in painful symptoms.

In parallel to the improvements in pain after treatment, both groups demonstrated statistically significant improvements (p<0.001) in tactile hypoesthesia across two different testing modalities (PPT and 2PTD). This finding further consolidated the relationship between the *somato*sensory disorder and neuropathic pain symptoms[13]. Specifically, these results added empirical support to the hypothesized *somato*sensory etiology of CRPS as related to a slight (mean PPT 2.7 gf) and partial tactile hypoaesthesia. The hypoaesthesia is considered slight because the PPT is less than 5 grams[3,20] and partial because the territory is circumscribed within the largest territory of cutaneous origin of the nerve branch[27] identified through the systematic assessment.

To the best of the authors' knowledge, there are no established minimum clinically important differences (MCIDs) of the MPQ for individuals with CRPS. A previous reference study[47] investigated MCIDs of the numerical rating scale for change in chronic musculoskeletal pain intensity; it considered a change of 15% as MCID[47]. Although these findings are not specific to the present population, it can be suggested that pain reduction observed in this study's groups based on the MPQ (Group A >49% and Group B >67%) surpass typical clinically relevant thresholds described in the literature for other chronic pain populations[48], besides being statistically significant.

This increased understanding of the potential contribution of Aβ axonal lesions, expressed as a tactile hypoaesthesia, to CRPS pathophysiological mechanisms highlights the importance of *somato*sensory-based approaches to CRPS[49]. Specifically, tailored therapeutic assessment and interventions based on patients' somatosensory profile may support the decision-making process between patients with CRPS and healthcare providers. A population-based cross-sectional online survey of people living with chronic pain in Canada found that a majority of respondents reported facing difficult decisions regarding treatment choice and daily life[50]. Structured *somato*sensory interventions informed by somatosensory assessments, such as the method of SPR, can facilitate discussion between chronic pain patients and therapists on activities of daily living to avoid or to adapt. The present study's findings further contribute to CRPS literature by evaluating the efficacy of *somato*sensory-based interventions in treating SMA, a common feature of CRPS that that negatively contributes to intervention outcome and is often unaccounted for in rehabilitation research[49].

Given the smaller manifestation of the slight tactile hypoaesthesia, clinicians may overlook its assessment and treatment, which may lead to chronicity of painful symptoms. In fact, this pathophysiology was understood historically: in 1947, Nathan published a series of 22 CRPS Type II (previously known as causalgias[28]) of which 18 had minor lesions and only 4 had a neurotmesis[51]. In addition, reference authors[2] designed a multicentric cohort study of 113 CRPS and found that only 57.7% of their sample presented with a tactile hypoaesthesia[21]. However, 68.8% of them presented with an additional SMA diagnosis of the same nerve branch. Now that the etiology of SMA is supported as deriving from an underlying tactile hypoaesthesia[19], it can be suggested that their 57.7% may not accurately represent the total prevalence of tactile hypoesthesia: those presenting with SMA likely had a paradoxical painful touch-evoked underlying tactile HYPOaesthesia. The present study's authors advocate for the careful longitudinal evaluation of persons with CRPS to better identify and address residual areas of HYPOaesthesia after the resolution of SMA.

Given the relationship between CRPS symptoms and tactile hypoaesthesia as demonstrated herein, further research on aesthesiography as an objective clinical examination of neuropathic features in CRPS is needed. Aesthesiography and MPQ neuropathic descriptors facilitate the identification of the impaired nerve branch, assisting clinicians to precisely identify the territory where patients should avoid stimulation in the case of SMA, and apply stimulation in the case of hypoaesthesia.[9,11] Traditional medical examinations (*e.g.*, electromyography) may not detect Aβ axonal lesions[52] but may instead temporarily exacerbate painful symptoms[53]. Incorporating systematic examination of somatosensory dysfunction[54] instead is concordant with the recommendations for objective assessments in CRPS clinical trials[6] and can improve identification and management of the tactile hypoesthesia, contributing to the development and maintenance of CRPS symptoms.

The evidence presented here adds to previous reports on the effects of SPR in multiple patient cohorts. In 2008, observations derived from 43 neuropathic pain patients including 7 diagnosed with CRPS concluded that SMA is a paradoxical painful tactile hypoaesthesia[43]. Ten years later, in a cohort of 48 peoples meeting the Budapest criteria for CRPS of the upper limb, cutaneous nerve branches were identified as underlying the allodynic territories[9]. In 2024, a cohort of 84 people with CRPS of the foot confirmed that SMA is a paradoxical painful touch-evoked HYPOaesthesia - even if there is minimal loss of tactile acuity (slight hypoesthesia) and this is only present in part of the painful territory (partial hypoesthesia)[19]. Taken together, this suggests neurogenic mechanisms, specifically injured – *NOT* only impaired – Aβ axonal cutaneous nerve branches[52], are involved in CRPS' symptomatology. Unfortunately, in the absence of systematic somatosensory examination, some researchers have considered CRPS as a nociplastic pain, a kind of dysfunctional pain[55,56]. Even if consensus has not been achieved on CRPS' evaluation and management, "the neuroanatomical relation to the underlying cause must still be recognizable even if pain is not felt in the entire innervation territory of an affected peripheral nerve"[57].

Strengths of the study include systematic assessment using standardized measures, (*e.g.*, Budapest criteria). Although the continuous cohort was sampled from a single center, data was collected by multiple evaluators in clinical practice, decreasing potential bias from data collection from a single clinician.

The absence of a control group in this study does not take into account potential confounding factors and thus limits the ability to draw causal conclusions; head-to-head comparisons of other treatments for CRPS are needed to increase confidence in these findings.

However, this represents a relatively large sample for a study of CRPS focusing only on the lower extremity. Furthermore, while aesthesiography is a standardized clinical examination, there are no currently published reports of its reliability. The use of other well recognized assessments of tactile hypoesthesia, such as the PPT and static 2PDT, helps to address this.

CONCLUSION

The method of Somatosensory Pain Rehabilitation demonstrated large effects on pain and improved sensibility in patients with CRPS of the foot when a tailored somatosensory-based management strategy was applied for those with tactile hypoaesthesia OR paradoxical painful touch-evoked tactile hypoaesthesia – static mechanical allodynia.

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SUPPLEMENTARY MATERIAL

Supplementary material accompanies this paper.
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