Diagnosis and Outcomes of 225 Consecutive Cases of Complex Regional Pain Syndrome of the Hand

Francisco del Piñal, MD, PhD

Madrid, Spain

Background: The lack of specific tests and potential diagnostic inaccuracy may be behind the stunning figures of complex regional pain syndrome (CRPS) cases. The author tested the hypothesis that patients diagnosed with CRPS at referral could be assigned to recognized conditions and treated accordingly.

Methods: From January of 2018 to April of 2021, 225 consecutive patients attended the author's office having been diagnosed with and treated for CRPS for an average of 16 ± 26 months. There were 180 women and 45 men; no patient was excluded.

Results: All patients could be allocated in named conditions: 79 had a wrong diagnosis; seven had a true causalgia; 16 were dystonic-psychogenic hands; 20 presented a flare reaction; and 90 had an "irritative" carpal tunnel syndrome. The remaining 13 patients had a miscellany of symptoms within a substandard management setting. Surgery was offered to 175 with a correctable cause; 50 (20 of whom had a tangible cause responsible for their pain) declined, and their outcome is unknown. The remaining 125 were operated on and tracked for an average of 20 ± 9 months. In the operated group, pain dropped 7.5 ± 2.2 points ($P < 0.0001$) on a numerical rating scale of 0 to 10. Disabilities of the Arm, Shoulder, and Hand questionnaire scores fell from 80 to 16 ($P < 0.0001$). Patients who were operated on rated their satisfaction on a scale of 0 to 10 as 8.9 ± 1.9.

Conclusions: Unlike with CRPS, all patients in this series had a true, diagnosable condition explaining their clinical picture. Most patients who agreed to be operated on had a favorable outcome. *(Plast. Reconstr. Surg.* 152: 807, 2023.)

CLINICAL QUESTION/LEVEL OF EVIDENCE: Therapeutic, IV.

I only know that I know nothing.

—Socrates

Complex regional pain syndrome (CRPS)—also known as Sudeck atrophy, reflex sympathetic dystrophy, or algodystrophy)—is a well-recognized condition characterized by an abnormal painful response, usually presenting after trauma or surgery, and accompanied by characteristic vasomotor changes. CRPS is an endpoint diagnosis, with no known pathophysiology or effective treatment; rarely is surgery recommended.[1–5]

The failure to correctly define the clinical characteristics of CRPS and the lack of a diagnostic standard test can make CRPS a catchall for any painful condition of the upper limb. To counteract this trend, several diagnostic protocols have been presented.[1,6,7] However, these have been criticized for their lack of specificity.[8,9] In fact, specificity is the main issue, as CRPS signs and symptoms are common to other somatic conditions (fractures, malunions, nonunions, nerve injuries, among others),[10,11] psychosomatic and faked disorders (malingerers, conversion disorders),[12–14] and even simple immobilization.[15] The differential diagnosis may be difficult even for an experienced hand surgeon. Counterintuitively, most treatment

From private practice.

Received for publication April 5, 2022; accepted October 11, 2022.

DOI: 10.1097/PRS.0000000000010454

Disclosure statements are at the end of this article, following the correspondence information.

Related digital media are available in the full-text version of the article on www.PRSJournal.com.

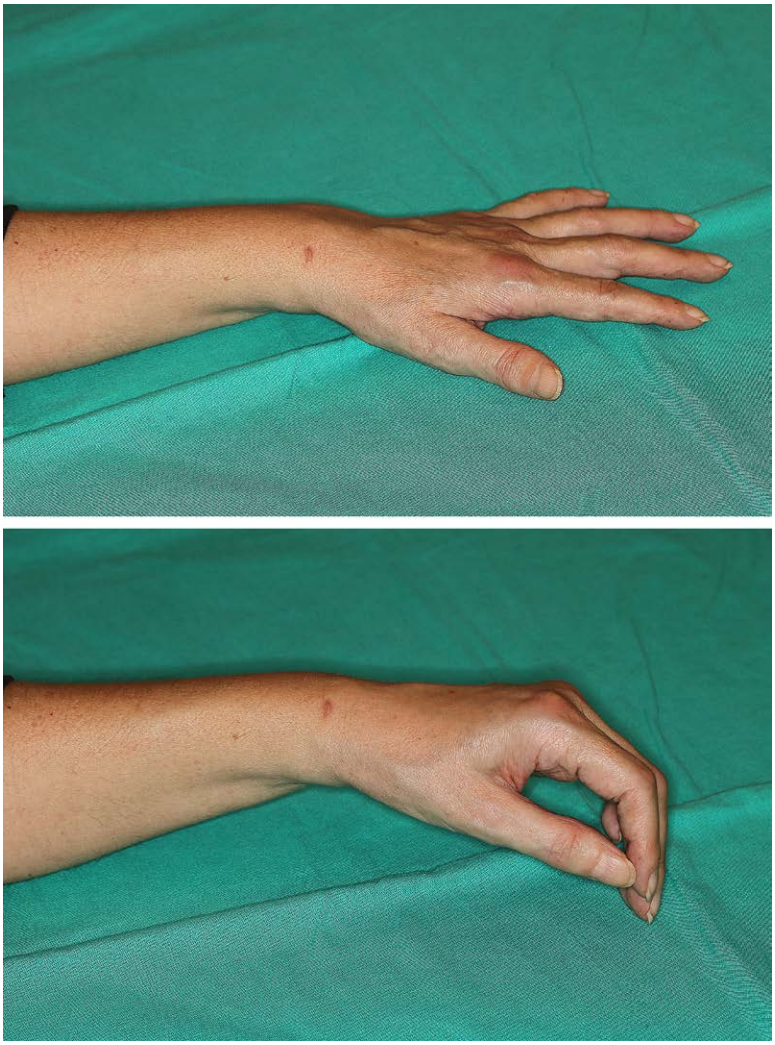

Fig. 1. The images show a 51-year-old woman (patient 196) 4 months after having been immobilized in a cast for a distal radius fracture, followed by physiotherapy. The tell-tale signs of CRPS are evident: swelling, mottling, and minimal range of motion because of pain, and also stiffness. Despite having been treated for CRPS at referral, she in fact had a radius malunion and achieved full range of motion after surgery.

trials have been run by nonhand surgeons, with no explanation as to how other conditions were excluded.[16] The low involvement of hand surgeons should come as no surprise, as the patient's undefined complaints, their normal tests, and the literature advising against surgery do little to make CRPS appealing to surgeons. Compounding the issue is the fact that we all tend to rush into the CRPS diagnosis following the scientifically unsupported lore that early diagnosis provides better outcomes.[2,3,5,7,17] Thus, as a rule, a patient with suspected CRPS in most hand clinics is rapidly referred to a CRPS specialist (variably a neurologist, a rheumatologist, or a pain or rehabilitation specialist) for definitive treatment to avoid a hypothetical worsening caused by a late referral.

In summary, although it is irrefutable that there are patients who fulfill all of the requisites to make a diagnosis of CRPS (Fig. 1),[1,6,7] it remains to be proven whether, by today's standards, they can be ascribed to known conditions and therefore treated successfully. In this respect, recently, carpal tunnel release (CTR) has been found curative in a group of patients who were diagnosed with CRPS.[18,19]

In an attempt to answer this conundrum, a two-part prospective study was conducted. The first part tested the hypothesis that all CRPS cases could be ascribed to known disorders. The second part presents the outcomes of those who had treatable

conditions and who accepted to undergo surgery. All categorizations and operations were carried out by the author, a full-time hand surgeon with 30 years of experience, with a double 1-year fellowship in hand and in microvascular surgery and with very considerable experience in wrist pathology and arthroscopy. The study was approved by the ethical committee of the Hospital Clínico, Universidad Complutense of Madrid (number 21-015).

PATIENTS AND METHODS

Study Setup

From January of 2018 to April of 2021, all new patients previously diagnosed with, and treated for, CRPS were included. The patients were examined by the author. Tests (mostly plain radiographs, computed tomographic scans, and electrophysiologic studies) were ordered as required to confirm the examiner's diagnostic suspicions. All patients who underwent surgery had preoperative and postoperative photographs and/or videos taken. Our institution holds a certificate (ISO 9001:2015) that guarantees that data collection, management of data, and informed consent comply with regulation 2016/679 of the European Parliament (copy in the editorial office).

Patients

There were 225 consecutive patients in the study period. No patient was excluded. There were 180 women and 45 men, with an average age of 52.4 ± 12.5 years (range, 13 to 87 years). A diagnosis of CRPS had been made 1 to 180 months before consultation with the author (average, 16 ± 26 months) by the previous treating surgeon, rehabilitation doctor, pain doctor, or these together. Most patients were self-referrals. Three-phase bone scintigraphy had been carried out in 65 patients, and in only three, it was negative for CRPS.

At the time of the first consultation with the author, all were receiving various combinations of opioids, anticonvulsants, antidepressants, steroids, calcitonin, bisphosphonates, and others. Seventy-six (34%) had also received stellate ganglion and/or peripheral nerve block(s), seven had undergone radiofrequency ablation of the stellate ganglion or peripheral nerves, and seven had a spinal cord stimulator in situ.

Albeit the aim of this study was not to ascertain whether the patients had or did not have CRPS at the time of the interview, it was evident that all of the patients had previously fulfilled the stipulated criteria for CRPS through the course of their management.[1,6,7] Furthermore, at the first consultation with the author, 204 (91%) still scored 4 or higher (diagnostic for CRPS) on the CRPS severity score.[7] (**See Table, Supplemental Digital Content 1**, which contains all detailed data pertaining to all patients in the series, ***http://links.lww.com/PRS/G120***.) Using general hand surgery knowledge, a categorization process was established and is summarized in Figure 2.

Patients with an alternative reason (inferred from the clinical history and supported by physical examination and tests) for their complaints were grouped under the "wrong diagnosis" heading. Patients with fixed hand postures, inexplicable hand positioning, nonanatomical lymphedema, and so forth, were diagnosed as having a dystonic-psychogenic hand (D-PH).[12,14] Patients with an evident nerve injury, neuroma, or neurodesis—provided this had not been caused iatrogenically—were diagnosed as having causalgia.[10,11]

Patients who presented signs and symptoms of CRPS, but whose pain was not sufficient to cause sleep interference, and who could not be allotted to any of the three previous headings, were considered to have a flare reaction (FR). Parenthetically, FR is poorly defined in the literature. As with CRPS, FR is characterized by a disproportionate degree of reactive erythema, stiffness, edema, and pain in the postoperative period. The boundary between CRPS and FR is nebulous (eg, more pain, more swelling).[17,20,21] As this frontier is so ill-defined, we arbitrarily considered interference with sleep as the differential between FR and "true" CRPS. Finally, all remaining cases in the series who could not be fitted into any of the previous four headings (ie, all true CRPS) were labeled as irritative carpal tunnel syndrome (ICTS).[18,19]

Surgery was directed to the specific mechanical problem or nerve when dealing with the wrong diagnosis and causalgia groups. Initially, CTR was recommended for any D-PHs, but the policy changed during the study because of the mixed results in this group (see Discussion).[19] All ICTS patients, and FR patients who worsened, underwent CTR. Surgery was performed where possible under local infiltration to assess any improvement in range of motion at the time of surgery. [**See Video 1 (online)**, which shows the response to surgery for patient 1. **See Video 2 (online)**, which shows the response to surgery in the youngest patient of the series (patient 206).]

Outcome Assessment

Operated patients were asked to rate their pain preoperatively and at final follow-up on a numerical

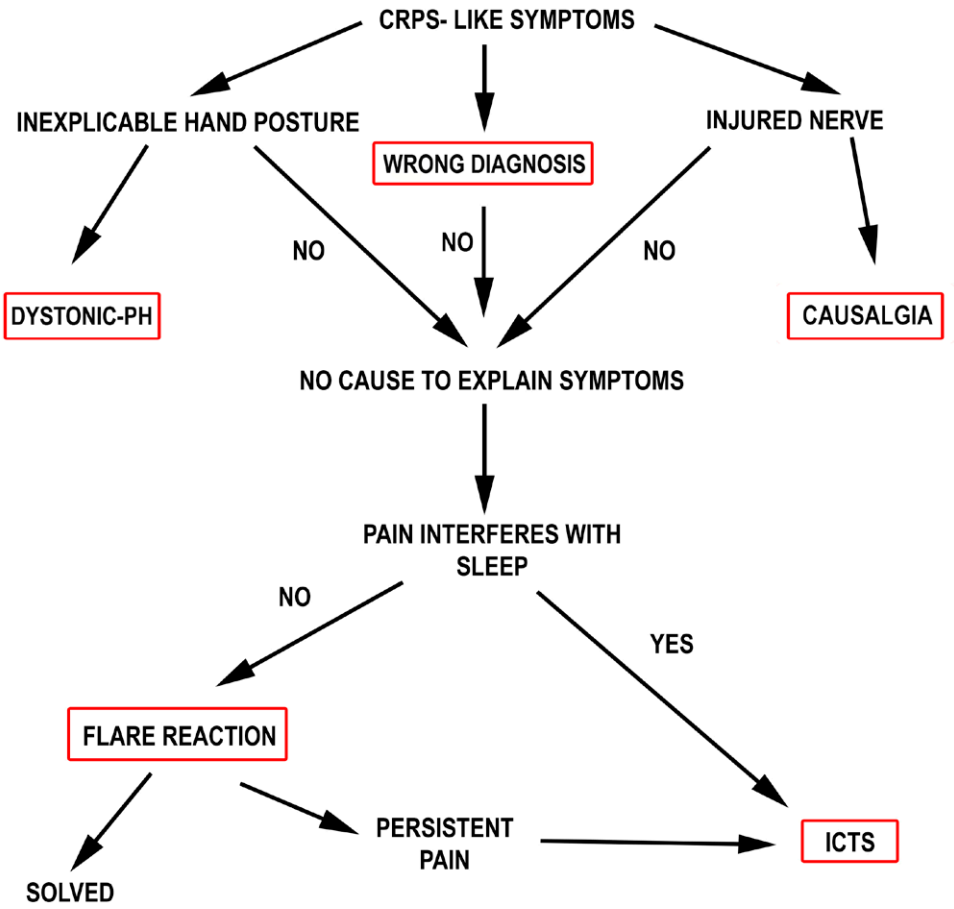

Fig. 2. Flowchart summarizing the diagnosis process. *D-PH*, dystonic-psychogenic hand; *ICTS*, irritative carpal tunnel syndrome.

rating scale (NRS), where 0 was nil/minimum and 10 was unbearable/maximum. Operated patients completed the Disabilities of the Arm, Shoulder and Hand (DASH) questionnaire preoperatively, and at final follow-up. The patients were also asked to rate their satisfaction with the operation on an NRS [0 (not satisfied) to 10 (very satisfied)].

Statistical Analysis

Continuous variables were expressed as means and standard deviations, and categorical variables were expressed as numbers and percentages. Parametric (paired *t*) and nonparametric (Wilcoxon) tests were used to analyze differences between pain and DASH preoperatively and postoperatively, according to whether or not variables satisfied a normal distribution. Values of $P < 0.05$ were considered statistically significant.

RESULTS

Of the 225 patients, 50 were found not to require surgery (mainly dystonic hands, flare reaction cases, or minor stiffness). The rest (175) were found to have an abnormality that could respond to surgery (for the most mechanical issues, causalgia cases, and ICTS) (Fig. 3). Fifty patients declined the recommendation for surgery and never returned after being informed of their new diagnosis. Those patients were categorized only, and their ultimate fate is unknown. The distribution was similar to the operated group, in terms of age ($P = 0.932$), sex ($P = 0.595$), or time since the diagnosis ($P = 0.103$). The remaining 125 patients were examined by the author and/or contacted by phone at an average of 20 ± 9 months (range, 6 to 45 months). Eight operative patients were unreachable or had died, and their last record was used in this report (always >6 months).

Part I: Categorization

All but 13 of the patients could be assigned to one of the five categories in Figure 2 and Table 1 (**see Table, Supplemental Digital Content 1**, ***http://links.lww.com/PRS/G120***). Seventy-nine had an unrecognized abnormality responsible

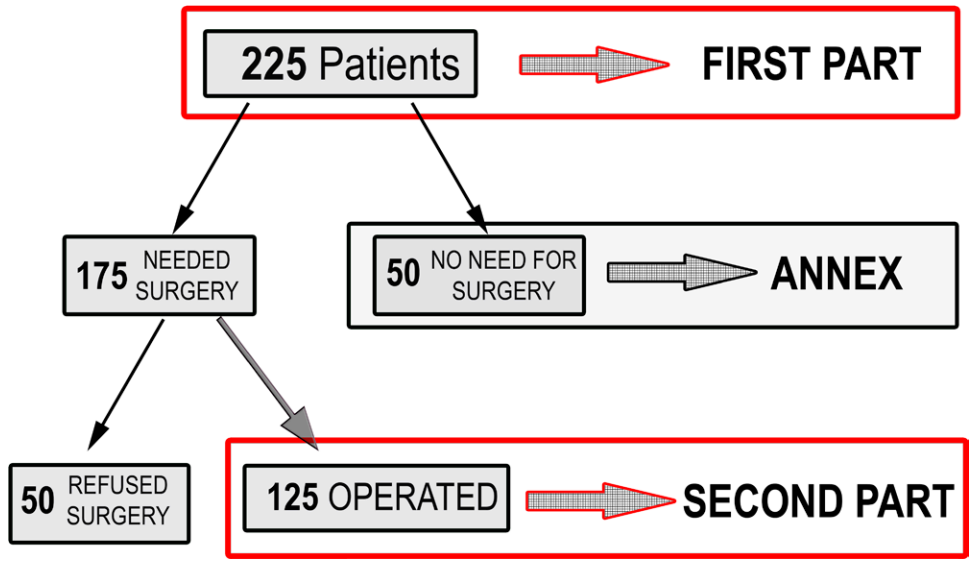

Fig. 3. Patient flow in this research. All 225 patients are included in the categorization process. Part 2 of the study deals with the 125 operative patients.

Table 1. Diagnostic Breakdown of the Patients of the Series

			Surgery Recommended	
	No. of Cases (%)	Surgery Not Needed (%)	Refused (%)	Accepted (%)
Wrong diagnosis	79 (35)	11 (14)	19 (24)	49 (62)
Causalgia	7 (3)	1 (14)	4 (29)	2 (57)
Dystonic-psychogenic hand	16 (7)	11 (69)	0 (0)	5 (31)
FR	20 (9)	17 (85)	0 (0)	3 (15)
ICTS	90 (40)	0 (0)	24 (27)	66 (73)
Miscellaneous	13 (6)	10 (77)	3 (23)	0 (0)
Total	225 (100)	50 (22)	50 (22)	125 (56)

for their pain; nearly half of these were a consequence of mismanagement of a distal radius or carpal fracture (Fig. 1). However, this group also included insufficiently released median nerves after CTR, iatrogenic neuromas, unrecognized Volkmann contractures, and others (full details of these can be found in **Table, Supplemental Digital Content 1**, ***http://links.lww.com/PRS/G120***).

There were 10 cases of "overdiagnosis" in the series (ie, 10 patients who never had undue pain or anything other than signs and symptoms of their underlying abnormality). Five were considered in the wrong-diagnosis group, as the CRPS label had a deleterious effect on them. In three, "Dr. Google" caused such anxiety that psychiatric support was required before coming for assessment by the author. The other two had a stellate ganglion block despite not reporting pain and having a good range of motion. This had been justified "to control swelling."

We saw seven causalgia cases: a patient with Wartenberg syndrome, a patient with partial laceration of the median nerve; and five patients with various degrees of damage to sensory nerves. There were 16 D-PHs, five of which had prominent tremor. With the exception of one case of factitious lymphedema, they were all inexplicable postures (Fig. 4). [**See Figure, Supplemental Digital Content 2**, which shows thumbnails of the D-PH cases (a crop of this picture is shown in Fig. 4). Note that patients 46 and 157, clear malingerers, are not included, as they did not allow photographs of their hands to be taken. The bandage marks are highlighted by *arrows* in the forearm magnetic resonance imaging scans of patient 212, who presented factitious lymphedema, ***http://links.lww.com/PRS/G121***.]

There were 20 FR cases, and in three, a CTR was eventually performed. The majority of the series (90 cases) presented an ICTS.[18]

The remaining 13 patients were grouped under "miscellaneous." Common to these were differing levels of pain, deformity, and/or stiffness as a result of substandard management of their original injury or overdiagnosis (five of 10 cases).

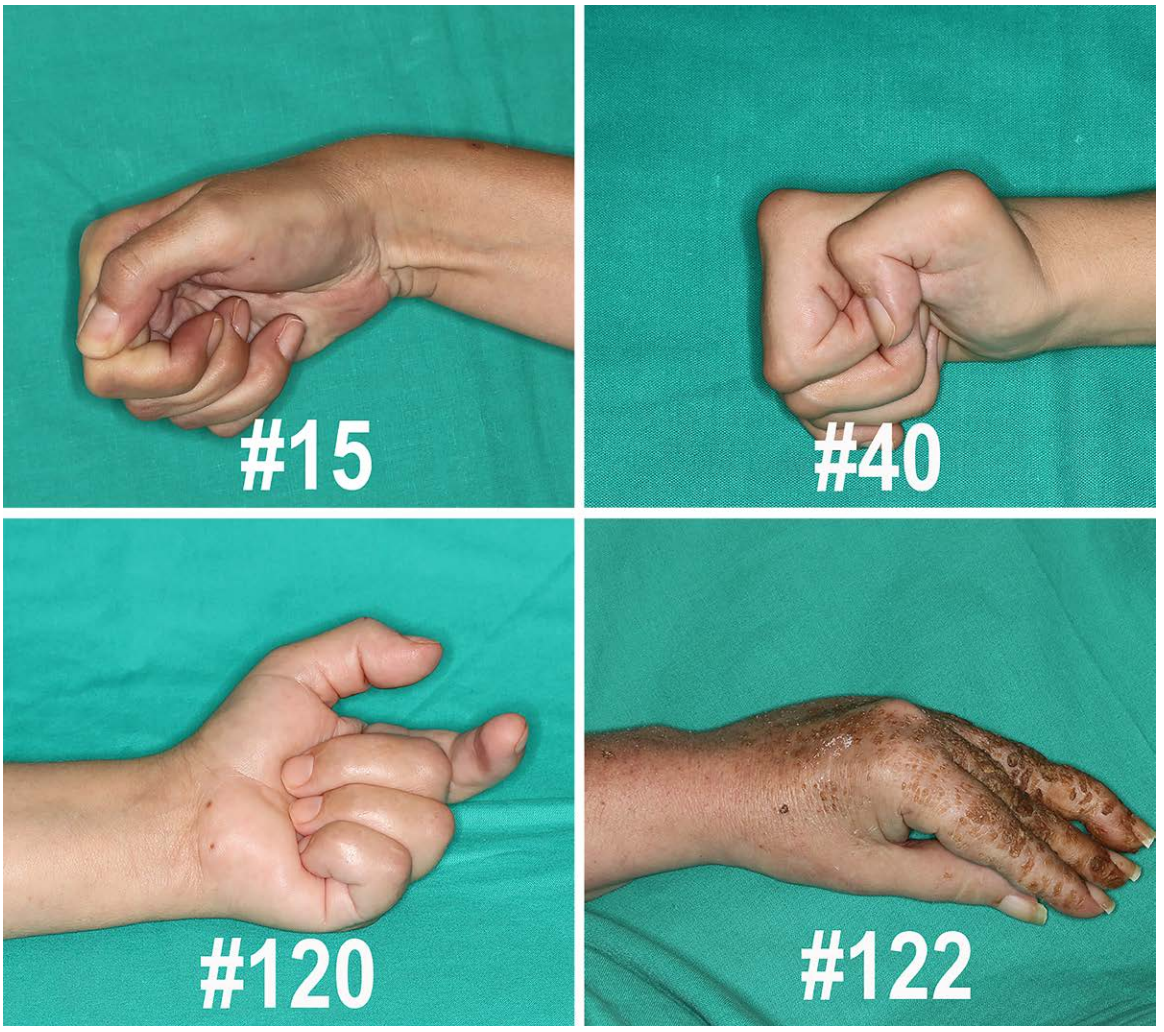

Fig. 4. Thumbnails of four patients of the D-PH group. All of them are included in **Figure**, **Supplemental Digital Content 2**, ***http://links.lww.com/PRS/G121***.

Part II: Outcomes of Surgery

A total of 125 patients were operated on. As a group, at an average period of 20 ± 9 months after surgery, operated patients' pain decreased from 8.5 to 1 ($P < 0.0001$); the DASH score decreased from 80 to 16 ($P < 0.0001$); and their overall satisfaction with the operation was 8.9 ± 1.9 on average. The breakdown for each group is presented in Table 2, with full details available in **Table, Supplemental Digital Content 1**, ***http://links.lww.com/PRS/G120***.

Briefly, in the wrong-diagnosis group, 18 of 49 patients (27%) needed treatment only for their mechanical problem. A further 31 of 49 patients (63%) in this same group, in addition to requiring surgery to the mechanical problem, also needed a CTR to deal with a concomitant ICTS. Seventy-two more patients received a CTR for causalgia ($n = 1$), dystonic-psychogenic hands ($n = 5$), FR ($n = 3$), and ICTS ($n = 63$). Two patients had endoscopic release of a concomitant pronator syndrome, and one patient needed only a neuroma relocation.

Complications and Failures

One patient, who sustained a radius shaft fracture during hardware removal, reported very little improvement following the operation. However, her pain disappeared after CTR revision and endoscopic pronator tunnel release.

Seven patients could not be weaned off neuropathic drugs. Five of the patients with failed treatment had had previous nerve injury or surgery (three to treat neuromas and two previously failed CTRs). Three of those five had recurrence of their pain after a dramatic early improvement following surgery and did not improve after reexploration. A final patient declined further surgery. Two of

Table 2. Breakdown of the Procedures Performed on Operated Patients with Preoperative and Postoperative Values

Procedure	No. of Patients	Pain			DASH			Satisfaction (SD)
		Preoperative (SD)	Postoperative (SD)	*P*	Preoperative (SD)	Postoperative (SD)	*P*	
Wrong diagnosis								
Pure mechanical	18	7.1 (2.3)	0.8 (1.3)	0.0002	69 (15·9)	17 (12)	0.0002	9 (1.6)
Mechanical and ICTS	31	8.7 (1.3)	1.1 (1.9)	<0.0001	82 (13.4)	17 (18.6)	<0.0001	8.7 (1.9)
Causalgia								
Neuroma relocation (in both) and CTR (in one)	2	9.3 (1.1)	0 (0)	0.18	82 (19.1)	5 (3.5)	0.18	10 (0)
D-PH								
CTR	5	9.6 (0.9)	3.6 (4.5)	0.042	92 (9.3)	45 (39.5)	0.043	6.1 (4.4)
FR								
CTR (ICTS)	3	8.8 (1)	0 (0)	0.109	84 (11.9)	5 (4.6)	0.109	9.8 (0.3)
ICTS								
CTR	63	8.7 (1.3)	0.9 (1.8)	<0.0001	81 (12.7)	15 (14.7)	<0.0001	9 (1.6)
CTR and HAFF	3	8.7 (0.3)	1.2 (1.6)	0.109	78 (10.5)	9 (7.1)	0.109	9 (1)
Total	125	8.5 (1.5)	1 (1.9)	<0.0001	80 (13.9)	16 (17.4)	<0.0001	8.9 (1.9)

HAFF, hypothenar adipofascial flap.

Table 3. Breakdown of the Results in Nonoperated Patients

	No. of Patients	Pain			DASH			Satisfaction (SD)
		Initial (SD)	Final (SD)	*P*	Initial (SD)	Final (SD)	*P*	
Wrong diagnosis	8	3 (2.4)	1.1 (1.4)	0.011	46 (8.2)	20 (17.4)	0.017	7.9 (2.5)
Causalgia	1	4 (NA)	1 (NA)	(NA)	38 (NA)	8 (NA)	(NA)	10 (NA)
FR	15	6.1 (2.9)	0.5 (1.1)	0.001	74 (17.3)	19 (11.4)	0.0007	9.1 (1.4)
Miscellaneous	10	3.7 (2.5)	0.9 (0.9)	0.02	65 (22.2)	20 (12.5)	0.005	8.2 (1.3)
Total and mean values	34	4.6 (2.9)	0·8 (1.1)	<0.0001	63 (20.5)	19 (12.9)	<0.0001	8.6 (1.7)

NA, not applicable.

the patients with operated dystonic hands did not find surgery beneficial. Of the patients with failed treatment, six were, or had been, litigating for disability compensation, as compared with two of the remaining 118 operated patients.

Outcome of Nonoperated Patients

Although the aim of the second part of this article is to present the outcome of the operated patients, the outcome in the 50 patients who did not require surgery was also analyzed and is reported for completeness (Table 3). Patients were queried about their final pain and administered a DASH questionnaire. Two patients were excluded because their outcome was unrelated to CRPS (a cancer recurrence and a herpetic neuralgia), and a third patient had died. It is of note that the fate of the 11 D-PH patients is unknown, as they have rejected further contact when phoned for an update. In total, 34 of 47 responded and fully filled in the questionnaires. At a mean of 21 ± 17 months, their pain decreased from 4.6 to 0.8 on an NRS ($P < 0·0001$); the DASH score dropped from 63 to 19 ($P < 0.0001$); and they rated their satisfaction as 8.6 ± 1.7 (Table 3 shows the breakdown; **see Table, Supplemental Digital Content 1**, ***http://links.lww.com/PRS/G120***).

DISCUSSION

This study demonstrates that the acronym CRPS conceals a recognizable condition different from what we understand CRPS to be. It is of concern that a tangible—yet unrecognized—abnormality was found in 33% of the CRPS cases in this study.

Causalgia was rare in this series, particularly if we consider the experience of others.[10,11] For the cases we have seen, we follow Dr. Dellon's recommendations for neuromas to the letter.[11] In cases where the median nerve was insufficiently

released, dividing the carpal ligament was all that was done. However, if scarring was found, a hypothenar adipofascial flap was added.[22,23]

The term D-PH encompasses a heterogenous group that includes psychosomatic conditions but also malingering and "true" CRPS.[12,14] Physicians should be on the lookout for correctly diagnosing dystonic-CRPS (psychogenic hand) from the outset. On the one hand, "lack of identification of psychosomatic conditions from the beginning may ruin productive lives."[24] On the other hand, malingerers may receive undeserved compensation.

By the same token, there is a gray line between true CRPS and psychogenic hand, and cases may be mixed up. We explored this frontier by releasing the carpal tunnel on five of them. Three of the five, who incidentally complied with ICTS criteria,[19] were cured or improved. Considering that a placebo response cannot be excluded and the limited success, we stopped operating on this group pending more information.

Urging FR patients to attend pain clinics is not recommended, as it sets the patient onto a downward spiral of suffering, anxiety, and the intake of drugs, when most cases resolve spontaneously. Reassurance, physical therapy and, occasionally, gabapentinoids are all that is needed for most of these patients. If, as happened in three of 20, symptoms worsened, then CTR proved curative (Fig. 5). [**See Video 3 (online)**, which shows response to surgery in a patient with an FR who did not respond to medical management (patient 143)].

ICTS has been recognized recently as the cause of some CRPS cases.[18] The results were outstanding in this group, particularly when the finger joints were supple (Fig. 6).[19] [**See Video 4 (online)**, which shows response to surgery in a chronic CRPS case (patient 98).] It is likely that ICTS would fit into the newly recognized nociplastic pain type of syndromes.[25] Accordingly, allodynia has a nonanatomical distribution, and electrodiagnostic tests (biomarkers) were within normal parameters for most ICTS patients, contrary to that of standard carpal tunnel syndrome.[19]

We used similar measuring tools as in other studies. Our results stand up against any previous report. As an example, chronic CRPS patients (>1 year duration) have minimal hope of cure with standard or esoteric approaches.[26–29] Contrarily, in our study, there were 37 patients (30%) with a CRPS diagnosis for longer than 1 year (range, 13 to 160 months; average, 39 ± 36 months) who underwent surgery (**see Table, Supplemental Digital Content 1**, ***http://links.lww.com/PRS/G120***). In this subgroup, at the latest follow-up of 23 months (range, 10 to 37 months), the pain diminished from 8.4 to 1.4 on an NRS ($P < 0.0001$); the DASH score diminished from 79 to 17 ($P < 0.0001$); and the patients rated their satisfaction as 8.6 ± 2.1.

Despite the generally good results and high satisfaction of the operative patients, we also encountered poor results. Some were attributable to psychogenic hands undergoing surgery, as discussed previously, and the remainder could have been an underlying nerve abnormality unconsidered by the author[11]; a reforming of the carpal ligament[23]; a systemic cause[16]; or, perhaps, a nociplastic escalation,[25] as most of the patients with failed treatment had had previous iatrogenic

Fig. 5. (*Left*) Patient 143 is shown 4 months after an undisplaced humeral neck fracture and 2 months of physiotherapy. In the past month, her pain worsened from 6 of 10 to 9 of 10 and began to interfere with her sleep. (*Right*) Six months after CTR. Her pain was 0 of 10. [**See Video 3 (online)**, which shows this patient's response to surgery].

Fig. 6. (*Left*) Patient 98 is shown attempting to make a tight fist 38 months after being diagnosed with CRPS following a scaphoid fracture. Despite multidrug therapy, she rated her pain as 10 of 10. The electrodiagnostic studies were negative. (*Center*) Active flexion immediately after CTR under local anesthesia. The next day, she rated her pain as 0 of 10, and this remained the same at the 2.2-year follow-up (*right*) [**See Video 4 (online)**].

nerve damage. Further research is needed to understand and properly treat this residual group.

Several limitations of this observational study exist because of the lack of a control group. Nevertheless, observational studies are strengthened by a single observer. In the current work, the author interviewed all patients, recorded all data, and operated on all patients. The occurrence of systematic error was prevented because the data presented are subjective, and validated questionnaires were administered. In fact, self-reported pain provides the accepted standard in assessing pain and allows comparison with any other study.[30]

A potential concern is the number of patients who were lost because they refused to be operated on or to receive further treatment. Reasons given were the cost of private care and the lack of confidence in the possibility of solving their symptoms, supported by the original doctor and, in turn, by the current literature. However, this does not discredit the study, as there was no selection bias on that decision other than patient choice. Nonetheless, 20 of the 50 who refused surgery were in any case wrongly allocated in CRPS, as they had an undetected tangible cause explaining their pain. [**See Figure, Supplemental Digital Content 3**, which shows thumbnails of the tangible cause cases who refused the surgery recommended. Painful neuromas are represented as a *yellow line with a dot* at their exact location. *Stippled areas* depict zones of painful paresthesias. Eight of the above (numbered in *black*) had had their CRPS diagnosis supported by a three-phase bone scintigraphy, ***http://links.lww.com/PRS/G122***.]

SUMMARY

In summary, if the psychogenic hands, wrong diagnosis, causalgia, and FR cases are correctly identified, it can be stated that the remaining true CRPS cases are ICTS. In contrast to the standard management for CRPS, surgery is curative in those instances. This study casts serious doubts on the existence in the hand of the condition known as CRPS/reflex sympathetic dystrophy/Sudeck/algodystrophy at all, and ushers in the need for further research in other anatomical areas in which this "diagnosis" is made.

Francisco del Piñal, MD, PhD
Serrano 58-1B
E- 28001 Madrid, Spain
pacopinal@gmail.com

DISCLOSURE

The author has no financial interests to disclose.

PATIENT CONSENT

Patients provided written informed consent for the use of their images.

REFERENCES

1. Veldman PH, Reynen HM, Arntz IE, Goris RJ. Signs and symptoms of reflex sympathetic dystrophy: prospective study of 829 patients. *Lancet* 1993;342:1012–1016.
2. Marinus J, Moseley GL, Birklein F, et al. Clinical features and pathophysiology of complex regional pain syndrome. *Lancet Neurol.* 2011;10:637–648.
3. Bruehl S. Complex regional pain syndrome. *BMJ* 2015;350:h2730.
4. Birklein F, Ajit SK, Goebel A, Perez RSGM, Sommer C. Complex regional pain syndrome—phenotypic characteristics and potential biomarkers. *Nat Rev Neurol.* 2018;14:272–284.

5. Goebel A, Barker CH, Turner-Stokes L; Membership of the Guideline Development Panel for 2018. *Complex Regional Pain Syndrome in Adults: UK Guidelines for Diagnosis, Referral and Management in Primary and Secondary Care*. London: Royal College of Physicians; 2018.
6. Harden RN, Bruehl S, Perez RSGM, et al. Validation of proposed diagnostic criteria (the "Budapest criteria") for complex regional pain syndrome. *Pain* 2010;150:268–274.
7. Żyluk A, Mosiejczuk H. A comparison of the accuracy of two sets of diagnostic criteria in the early detection of complex regional pain syndrome following surgical treatment of distal radial fractures. *J Hand Surg Eur Vol.* 2013;38:609–615.
8. del Piñal F. Editorial: I have a dream ... reflex sympathetic dystrophy (RSD or complex regional pain syndrome - CRPS I) does not exist. *J Hand Surg Eur Vol.* 2013;38:595–597.
9. Chang C, McDonnell P, Gershwin ME. Complex regional pain syndrome—false hopes and miscommunications. *Autoimmun Rev.* 2019;18:270–278.
10. Jupiter JB, Seiler JG III, Zienowicz R. Sympathetic maintained pain (causalgia) associated with a demonstrable peripheral-nerve lesion. Operative treatment. *J Bone Joint Surg Am.* 1994;76:1376–1384.
11. Dellon AL. Surgical treatment of upper extremity pain. *Hand Clin.* 2016;32:71–80.
12. Kasdan ML, Stutts JT. Factitious injuries of the upper extremity. *J Hand Surg Am.* 1995;20:S57–S60.
13. Ochoa JL, Verdugo RJ. Neuropathic pain syndrome displayed by malingerers. *J Neuropsychiatry Clin Neurosci.* 2010;22:278–286.
14. Schrag A, Trimble M, Quinn N, Bhatia K. The syndrome of fixed dystonia: an evaluation of 103 patients. *Brain* 2004;127:2360–2372.
15. Pepper A, Li W, Kingery WS, Angst MS, Curtin CM, Clark JD. Changes resembling complex regional pain syndrome following surgery and immobilization. *J Pain* 2013;14:516–524.
16. Barth RJ, Haralson R. Differential diagnosis for complex regional pain syndrome. *Guides Newslett.* 2007;12:1–4, 12–16.
17. Lankford LL. Reflex sympathetic dystrophy. In: Green DP, ed. *Operative Hand Surgery*. 2nd ed. New York: Churchill Livingstone; 1988:633–663.
18. del Piñal F. Reflex sympathetic dystrophy (RSD)/CRPS/Sudeck does not exist. *Ezine (IFSSH)* 2019;9:22–31.
19. del Piñal F. Outcomes of carpal tunnel release in CRPS/reflex sympathetic dystrophy/Sudeck patients. *Plast Reconstr Surg.* 2022;150:93–101.
20. Howard LD Jr. Dupuytren's contracture: a guide for management. *Clin Orthop.* 1959;15:118–126.
21. Zemel NP, Balcomb TV, Stark HH, et al. Dupuytren's disease in women: evaluation of long-term results after operation. *J Hand Surg Am.* 1987;12:1012–1016.
22. Strickland JW, Idler RS, Lourie GM, Plancher KD. The hypothenar fat pad flap for management of recalcitrant carpal tunnel syndrome. *J Hand Surg Am.* 1996;21:840–848.
23. Jones NF, Ahn HC, Eo S. Revision surgery for persistent and recurrent carpal tunnel syndrome and for failed carpal tunnel release. *Plast Reconstr Surg.* 2012;129:683–692.
24. Shorter E. Sucker-punched again! Physicians meet the disease-of-the-month syndrome. *J Psychosom Res.* 1995;39:115–118.
25. Fitzcharles MA, Cohen SP, Clauw DJ, Littlejohn G, Usui C, Häuser W. Nociplastic pain: towards an understanding of prevalent pain conditions. *Lancet* 2021;397:2098–2110.
26. de Mos M, Huygen FJPM, van der Hoeven-Borgman M, Dieleman JP, Ch Stricker BH, Sturkenboom MCJM. Outcome of the complex regional pain syndrome. *Clin J Pain* 2009;25:590–597.
27. Schwartzman RJ, Erwin KL, Alexander GM. The natural history of complex regional pain syndrome. *Clin J Pain* 2009;25:273–280.
28. Sigtermans MJ, van Hilten JJ, Bauer MCR, et al. Ketamine produces effective and long-term pain relief in patients with complex regional pain syndrome type 1. *Pain* 2009;145:304–311.
29. Zyluk A, Puchalski P. Pain control in chronic, refractory CRPS by continuous brachial plexus analgesia. *Handchir Mikrochir Plast Chir.* 2018;50:190–195.
30. Dworkin RH, Turk DC, Farrar JT, et al. Core outcome measures for chronic pain clinical trials: IMMPACT recommendations. *Pain* 2005;113:9–19.