



A Ten-Year Retrospective Study on the Prevalence of CRPS in TBI at a Single Level 1 Trauma Center

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Introduction

Complex regional pain syndrome (CRPS) is a disorder of a body region, which is characterized by pain, swelling, limited range of motion, etc. A diagnosis of CRPS-I is purely clinical and some patients with cognitive impairment after a stroke or brain injury are unable to describe the symptoms. As a diagnosis in these patients, Three-phase bone scintigraphy (TPBS) has been widely used to diagnose CRPS-I. However, no study has examined the prevalence of CRPS in TBI patients using TPBS. By examining the prevalence and characteristics of CRPS in TBI patients, we suggest that the possibility of pain and complications of TBI patients accompanied by cognitive decline is a point to be considered.

Methods

For 10 years, 6540 patients with traumatic brain injuries were registered. TBI patients who underwent TPBS were categorized based on their gender, age, Glasgow Coma Scale (GCS), Injury Severity Score (ISS), ICU length of stay, EMG execution status, MMSE, presence of spinal cord injury, and whether they received treatment. On this paper, we classified the severity of TBI. We defined patients with mild TBI who had LOC shorter than 1 hour and GCS scores of 13 to 15, while those with moderate to severe TBI had LOC longer than 1 hour and GCS scores of 12 or less.

Results

Among 6540 patients, 189 patients underwent TPBS, 25 patients were diagnosed with CRPS-I. The prevalence of CRPS in TBI patients was 0.3%. Additionally, among the 189 patients with suspected CRPS, 25 were diagnosed with CRPS-I, resulting in a rate of approximately 13%. The most common site of CRPS diagnosed through TPBS was the wrist. The initial GCS score was 10.83, with 9 patients having mild TBI (GCS 13 or higher) and 16 patients having moderate to severe TBI (GCS 12 or lower). The most common symptom/sign in patients was pain, followed by edema and ROM limitation.[Table 1]. On mild TBI patients, the most common symptom/sign was pain. In moderate to severe TBI, the most common symptom/sign was pain, and sudomotor/edema symptoms were followed. [Table 2]

Discussion

The prevalence of poststroke CRPS was 8.94% in patients with first-ever stroke. However, on our study, the prevalence of CRPS in TBI patients accounting for less than 0.3%. This difference may be due to the low rate of patients with TBI undergoing TPBS for suspected CRPS, as well as the difficulty in expressing symptoms due to cognitive impairment, which may lead to the initial suspicion of CRPS being overlooked. Although TPBS is not the gold standard for diagnosing CRPS, considering the severity and characteristics of patients with TBI, and the fact that diagnosis rate was relatively high at around 13%, it may be a reasonable option to consider the test, especially since CRPS may occur more frequently in patients with severe injuries. Also, we suggest that when diagnosing and evaluating CRPS, more attention should be paid to clinical features such as edema in patients with severe traumatic brain injury.

Figure 1. Research Flowchart

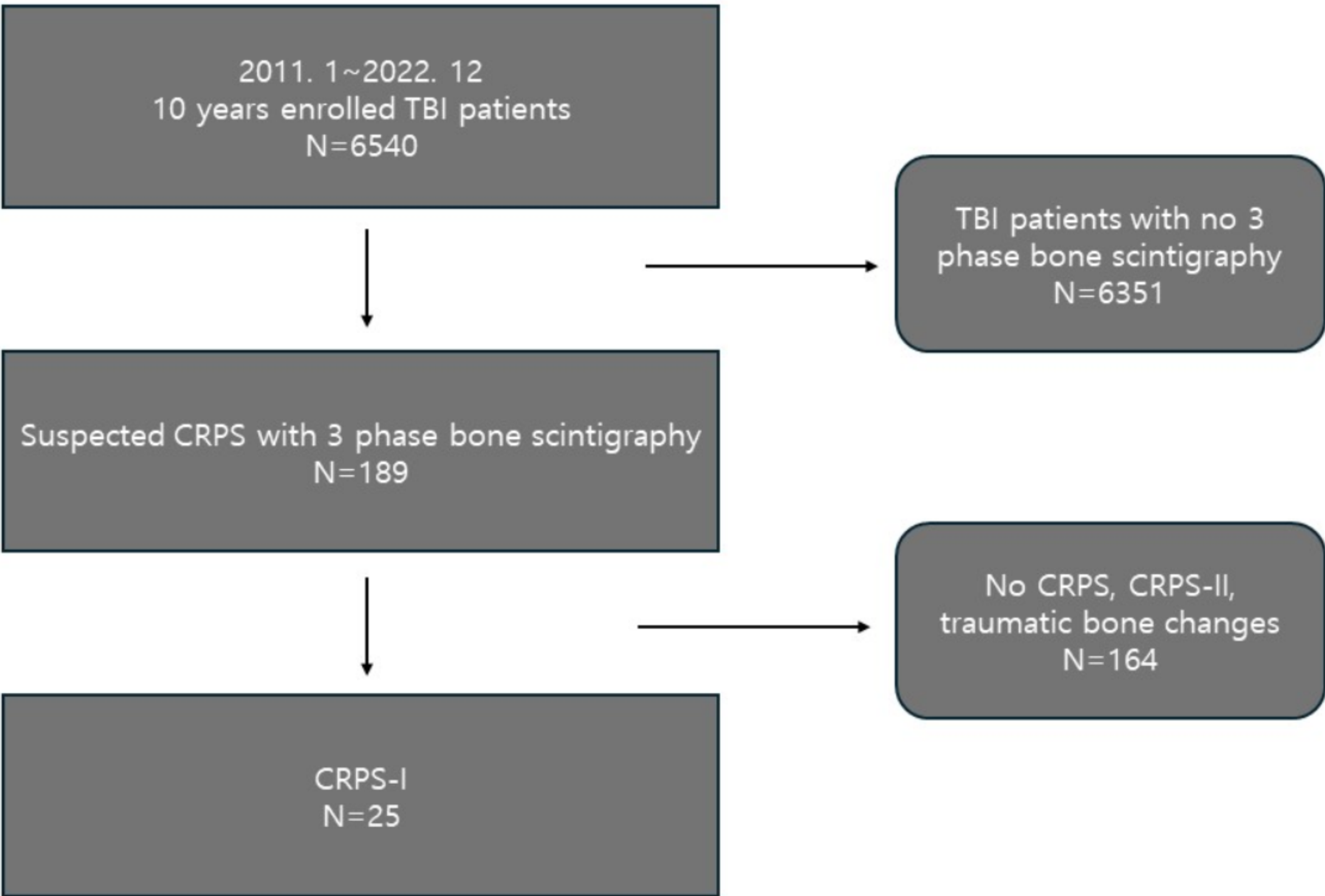


Table 1. Characteristics of CRPS in traumatic brain injured patients

		N=25
Age		63.96 ± 13.09
Sex	Male	20
	Female	5
Initial GCS*		10.83 ± 3.23
ICU* admission day		22.42 ± 16.89
ISS* score		25.38 ± 7.31
MMSE*		8.875 ± 8.54
Spinal cord injury		2
Mechanism of injury	TA*	9
	Fall	15
	Assault	1
Symptoms and signs	Pain	20
	Sensory	0
	Vasomotor	3
	Sudomotor/Edema	10
	Motor/Trophic	5
CRPS* site	Wrist	16
	Hand	7
	Upper extremities	6
	Elbow	4
	Shoulder	1
	Arm	1
Treatment	Steroid pulse therapy	7
	NSAID*	6
	Steroid + NSAID*	2

*CRPS : Complex regional pain syndrome *GCS : Glasgow coma scale, *ICU : Intensive care unit,
*ISS : Injury severity score, *MMSE : Mini mental state examination, * TA : Traffic accident,
*NSAID : Nonsteroidal anti-inflammatory drug

Table 2. Symptoms and signs of CRPS in mild, moderate to severe TBI

Symptoms/Signs	Mild TBI*(N=9)	Moderate to severe TBI*(N=16)
Pain	8	12
Sensory	0	NT*
Vasomotor	0	3
Sudomotor/Edema	1	9
Motor/Trophic	1	4
No symptoms	1	3

*TBI : Traumatic brain injury, *NT : Non testable