

The Use of Stellate Ganglion Block and Interscalene Brachial Plexus Catheter to Treat Shoulder Hand Syndrome – A Case Report

Amitav Vikram Philip¹, Kiran Sasi², Rahul Pillai¹, Sajan Philip George¹

¹Department of Anaesthesia, Christian Medical College, Vellore, Tamil Nadu, India

²Paul Brand Centre for Hand and Leprosy Reconstructive Surgery, Christian Medical College, Vellore, Tamil Nadu, India.

Abstract

Complex regional pain syndrome (CRPS) may develop following trivial trauma and can lead to chronic debilitating pain and dysfunction. There is limited use of sympathetic blocks in the management of CRPS; however, in patients with sympathetically mediated pain, this modality may be of value. In this paper, we report the case of a 50-year-old milkman who was diagnosed with left sided Shoulder Hand Syndrome (CRPS type 1) following prolonged immobilization after sustaining a left 3rd metacarpal fracture. The management plan included the use of a single injection stellate ganglion block and an interscalene brachial plexus catheter which was maintained for one week in order to mitigate the pain cycle. This allowed greater compliance to physical therapy and psychosocial rehabilitation of the patient. The patient reported excellent pain relief with return to his work.

Keywords: CRPS Type 1, Interscalene brachial plexus catheter, Stellate ganglion block

Introduction

Complex regional pain syndrome (CRPS) is a debilitating condition which is characterised by continuous regional pain which is disproportionate to the inciting event and may be either spontaneous or evoked. Based on two population studies the incidence of CRPS falls between 5.5 and 26.2 cases per 100,000 people per year [1]. Despite the risk of permanent disability there is no consistently efficacious treatment regimen for this condition [2]. Various theories have been attributed to the condition; however, no single theory best explains the pathophysiology of CRPS. Sympathetic blockade has been studied in the treatment of CRPS with varying results. One of common concerns is the limited duration of relief offered by a single dose of local anaesthetic and thereby only offering temporary benefit in the treatment of CRPS. Another concern is that no clear protocol exists to dictate in which cases this intervention is recommended [3].

We report the management of a patient with Shoulder hand syndrome of the left upper extremity who presented with pain, stiffness and decreased range of motion of the affected limb. A timely multimodal approach using pain relief and physical and vocational rehabilitation was used. For analgesia, a stellate ganglion block was used, followed by an interscalene brachial plexus catheter which was maintained for 7 days to enable the patient to undergo physiotherapy.

Case Report

A 50-year-old gentleman presented to the hand surgery department with complaints of stiffness and pain of left shoulder and hand for a duration of 4 months, which was preventing him from conducting his vocation as a milkman. Following a road traffic accident, he was diagnosed with a 3rd metacarpal fracture and was treated with a below elbow cast for six weeks. The pain, swelling and decreased range of motion of his shoulder and hand joints progressively worsened in the weeks following the cast removal. He had no co-morbidities or history of previous surgery.

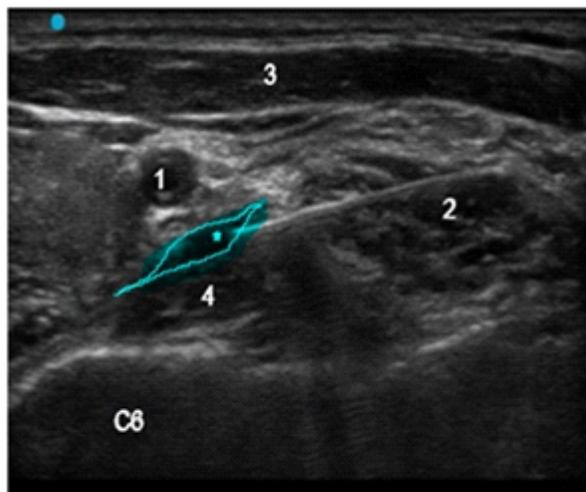
On examination, there was limitation of movements of the shoulder and joints of the hand which was associated with severe pain visual analog scale (VAS: 0 means no pain, 10 means worst imaginable pain) score of 8/10). The pain was continuous and sharp, and associated with paraesthesia over the shoulder and hand. It was diagnosed as Shoulder

Address of Correspondence: Dr. Amitav Vikram Philip, Christian Medical College, Vellore, Tamil Nadu, India. E-mail: a.philip442@gmail.com

Submitted: 15/03/2021; Reviewed: 10/05/2021; Accepted: 12/08/2021; Published: 10/01/2022

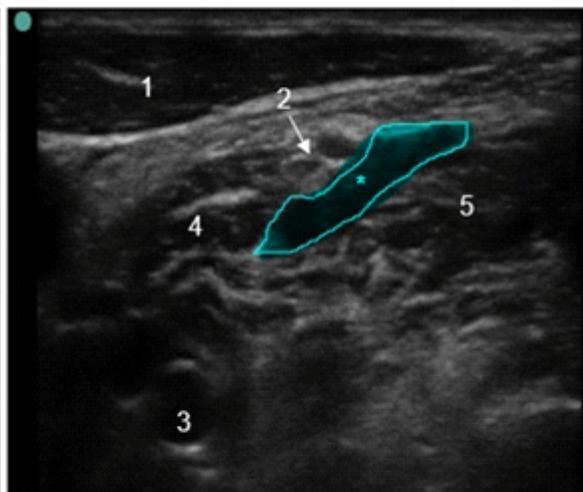
DOI: 10.13107/ijra.2022.v03i01.050 | www.ijrajournal.com |

This is an Open Access journal, and articles are distributed under the terms of the Creative Commons Attribution Non-Commercial-Share Alike 4.0 License (<http://creativecommons.org/licenses/by-nc-sa/4.0>) which allows others to remix, tweak, and build upon the work non-commercially as long as appropriate credit is given and the new creation are licensed under the identical terms.

**Figure 1 a**

Stellate ganglion block at C6 level

1- Internal Carotid artery, 2 - Anterior scalene muscle, 3 - sternocleidomastoid muscle, 4 - Longus colli muscle, (* - Highlighted in blue)– Drug injected into the prevertebral fascia overlying longus colli muscle

**Figure 1 b**

Interscalene Brachial Plexus nerve block

1- Sternocleidomastoid muscle, 2- C5-7 nerve roots, 3- Vertebral artery,
4 - Anterior Scalene Muscle, 5- Middle Scalene muscle, (* - Highlighted in blue)- Injectate between the fascial plane of the middle scalene muscle and the nerve roots

Hand Syndrome, a subset of CRPS type I. This was based on the presence of signs and symptoms of persisting disproportionate pain which was associated with allodynia and hyperalgesia, oedema of the hand, decreased range of motion of the shoulder joint and the small joints of the hand and trophic changes to the skin and nails [1].

The patient had been advised physiotherapy and range of movement exercises and was started on tablet gabapentin 100 mg per oral twice a day. Owing to the inadequate analgesia he was unable to perform the same. The patient was also self-medicating with tablet Aceclofenac 100 mg and tablet tramadol 50 mg to alleviate the pain.

In order to facilitate physiotherapy and functional recovery, we decided to perform a left stellate ganglion blockade and place a left interscalene brachial plexus catheter with intermittent bolus of local anaesthetic.

After taking an informed signed consent, intravenous access was secured on the right hand and standard monitors were established. The patient was positioned in the supine decubitus with the head slightly extended. The area of interest was cleaned with 2% chlorhexidine and alcohol skin preparation solution and sterile drapes were placed.

Using a linear ultrasound probe (6-15 MHz, Fujifilm Sonosite Inc.), an 'in-plane' left stellate ganglion block was performed at the C6 level (Figure 1a). Ten milliliters of 0.25% bupivacaine was injected in the prevertebral fascia overlying the longus colli muscle. The ultrasound guided interscalene brachial plexus block was then performed using an 'out of plane' approach (Figure 1b). An 18 Gauge Tuohy'

needle was introduced in the plane between the nerve roots and the prevertebral fascia overlying the middle scalene muscle, using normal saline to hydro-dissect this plane. A 20 G multi-orifice catheter was advanced 4 cm beyond the tip of the needle. Seven and a half milliliters cc of 0.2% ropivacaine was administered via the catheter. The catheter was tunnelled, labelled and secured with a clear occlusive dressing.

The patient's hemodynamic parameters were monitored in the recovery room. An obvious ptosis and miosis was noted and documented. The pain was assessed 30 minutes after the procedure and there was considerable reduction (VAS 4/10). On examination the motor power of the major muscle groups were preserved. There was decreased sensation over C5-C8 dermatomes.

Post procedure, 7.5 ml of 0.2% ropivacaine was given through the catheter 8th hourly for 7 days. Physiotherapy was initiated on the same evening after the procedure. The patient was assessed by the pain services team twice a day and the pain scores were noted. With a reduction in pain (mean VAS score 1/10), the patient was comfortable and able to achieve an acceptable range of motion at the wrist and shoulder joint at 12 weeks follow-up (Table 1). He was discharged after removal of the catheter on 7th day and was advised to continue the exercises he had been taught. At 12 weeks follow up, there was a significant improvement in his range of motion of the affected joints and his VAS score (1/10) (Figure 2).



Discussion

CRPS type I can be caused by an initiating noxious event caused by tissue injury, or by prolonged immobilization as in this case. The multifactorial pathophysiology of CRPS is best described by peripheral and central sensitization due to persistent noxious stimuli from the injured site. This leads to an abnormal increase in sensation manifested by allodynia and hyperalgesia [4, 5].

Due to the complexity of the syndrome, most authorities recommend a comprehensive and multimodal approach. This may include physical, occupational, vocational, psycho-social, pharmacological, and interventional strategies [6].

Pain in CRPS may be sympathetically mediated, non-sympathetically mediated or as a combination of both [7]. The stellate ganglion block may be considered in a select group of patients who are likely to benefit from mitigating the sympathetic mediated pain to initiate the process of breaking the pain cycle. However, a Cochrane review by Cepeda et al showed a scarcity of available literature to prove the efficacy of a stellate ganglion block with local anaesthetic for treating upper limb CRPS [8]. Conversely, a study by Yucel shows that a repeated stellate ganglion block successfully reduced VAS scores and significantly improved wrist joint ROM in 22 patients with CRPS type 1 [9]. The need for the patient to undergo serial stellate ganglion blocks creates additional risk and discomfort, thereby limiting the efficacy of the method [1, 9, 10].

In our patient we combined the use of a single injection

Joint		Pre-treatment ROM	Post-treatment ROM at 3 month follow-up
Metacarpo Phalangeal joint	Flexion- Index	40°	80°
	Middle	40°	85°
	Ring	35°	85°
	Little	35°	85°
	Extension- Index	-10°	0°
	Middle	-10°	0°
	Ring	-15°	0°
	Little	-10°	0°
Proximal Interphalangeal joint	Flexion- Index	40°	80°
	Middle	35°	90°
	Ring	35°	95°
	Little	30°	100°
	Extension- Index	-10°	-20°
	Middle	-10°	-20°
	Ring	-15°	-20°
	Little	-20°	-35°
Distal Interphalangeal joint	Flexion- Index	20°	50°
	Middle	20°	50°
	Ring	20°	55°
	Little	15°	45°
	Extension- Index	0°	0°
	Middle	0°	0°
	Ring	0°	0°
	Little	0°	0°
Digito-Palmar Distance	Index	5 cm	1 cm
	Middle	5 cm	1.5 cm
	Ring	5.5 cm	1.5 cm
	Little	6 cm	1 cm
wrist	Flexion	30°	50°
	Extension	35°	45°
Shoulder	Abduction	90°	170°
	External rotation	10°	45°

Table 1: ROM – Range of motion

stellate ganglion block with an interscalene brachial plexus catheter in order to facilitate continuous analgesia while initiating physiotherapy. Adequate analgesia is warranted for patients of shoulder hand syndrome to break the pain cycle [11]. The concentration of local anaesthetic administered by the interscalene catheter was adjusted to prevent motor weakness (0.2% Ropivacaine). This provides a positive psychological reinforcement which is essential for recovery of function. Additionally, the requirements for opioid and non-steroidal anti-inflammatory drugs are reduced.

At three months, the patient had a VAS score of 1/10. The flexion and extension of the wrist had also improved from 30° to 50° and 35° to 45° respectively. The abduction and external rotation of the shoulder joint had improved from 90° to 170° and 10° to 45° respectively in the same time period. The result of improved range of motion of the wrist joint is similar to the mean results achieved in the study conducted by Yucel et al. in which three stellate ganglion blocks were administered at a weekly interval [9]. The results of improved range of motion of the shoulder joint are comparable to the mean result achieved by the study conducted by Detaille et al. in which a continuous interscalene catheter administering low dose bupivacaine (0.0625%-0.125%) was used maintained for 1 week [12]. This suggests that a single stellate ganglion block combined

with an interscalene catheter maintained for a week may be a viable treatment option for improved range of motion in shoulder hand syndrome. However, randomized control trials are necessary to ascertain this.

Conclusion

Single injection stellate ganglion block combined with an interscalene catheter was used to successfully to break the patient's pain cycle and aid his functional recovery. The gains for our patient in terms of improved range of motion, analgesia and vocational rehabilitation suggests a scope for the use of this technique in patients with sympathetic mediated pain in shoulder hand syndrome.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the Journal. The patient understands that his name and initials will not be published, and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None

References

1. Birklein F, Dimova V. Complex regional pain syndrome—up-to-date. *PAIN Rep.* 2017 Dec;2(6):e624.
2. Detaille V, Busnel F, Ravary H, Jacquot A, Katz D, Allano G. Use of continuous interscalene brachial plexus block and rehabilitation to treat complex regional pain syndrome of the shoulder. *Ann Phys Rehabil Med.* 2010 Aug;53(6-7):406-16.
3. Ferrillo MG. Treatment of complex regional pain syndrome with stellate ganglion local anesthetic blockade: a case report of one patient's experiences with traditional bupivacaine HCl and liposome bupivacaine. *Clin Case Rep.* 2016 Jul 27;4(9):861-5.
4. Bruehl S. Complex regional pain syndrome. *BMJ.* 2015 Jul 29;h2730.
5. Bruehl S, Warner DS. An Update on the Pathophysiology of Complex Regional Pain Syndrome. *Anesthesiology.* 2010 Sep 1;113(3):713-25.
6. Ganty P, Chawla R. Complex regional pain syndrome: recent updates. *Contin Educ Anaesth Crit Care Pain.* 2014 Apr 1;14(2):79-84.
7. Albazaz R, Wong YT, Homer-Vanniasinkam S. Complex Regional Pain Syndrome: A Review. *Ann Vasc Surg.* 2008 Mar 1;22(2):297-306.
8. Cepeda MS, Lau J, Carr DB. Defining the Therapeutic Role of Local Anesthetic Sympathetic Blockade in Complex Regional Pain Syndrome: A Narrative and Systematic Review. *Clin J Pain.* 2002 Aug;18(4):216-33.
9. Yucel I, Demiraran Y, Ozturan K, Degirmenci E. Complex regional pain syndrome type I: efficacy of stellate ganglion blockade. *J Orthop Traumatol Off J Ital Soc Orthop Traumatol.* 2009 Dec;10(4):179.
10. Schürmann M, Gradl G, Wizgal I, Tutic M, Moser C, Azad S, et al. Clinical and Physiologic Evaluation of Stellate Ganglion Blockade for Complex Regional Pain Syndrome Type I. *Clin J Pain.* 2001 Mar;17(1):94-100.
11. Lierz P, Hoffmann P, Felleiter P, Hörauf K. [Interscalene plexus block for mobilizing chronic shoulder stiffness]. *Wien Klin Wochenschr.* 1998 Nov 13;110(21):766-9.
12. Detaille V, Busnel F, Ravary H, Jacquot A, Katz D, Allano G. Use of continuous interscalene brachial plexus block and rehabilitation to treat complex regional pain syndrome of the shoulder. *Ann Phys Rehabil Med.* 2010 Sep;53(6-7):406-16.

How to cite this article: Philip AV, Sasi K, Pillai R, George SP | The Use of Stellate Ganglion Block and Interscalene Brachial Plexus Catheter to Treat Shoulder Hand Syndrome – A Case Report | International Journal of Regional Anaesthesia | January-June 2022; 3(1): 23-26.