



Review Article

PHANTOM LIMB SYNDROME: AN AYURVEDIC PERSPECTIVE

Shakeel H Jamakhane^{1*}, M.R. Sajjanshetty², B.H. Katti³, V.V. Goudar⁴

*1PG Scholar, ²Professor & H.O.D, ³Professor, ⁴Lecturer, Department of PG Studies in Ayurveda Samhita Siddhanta, Shri Vijaya Mahantesh Ayurvedic Medical College and PG Research Centre, Ilkal, Karnataka, India.

Article info

Article History:

Received: 05-05-2022

Revised: 25-05-2022

Accepted: 15-06-2022

KEYWORDS:

Smriti Kaarana, Phantom limb syndrome, learned paralysis, *Prapti-Prapti* mismatch.

ABSTRACT

Phantom limb syndrome is a condition in which patients experience sensations, painful or otherwise, in a limb that does not exist. Phantom pain results from a condition called learned paralysis. Learned paralysis affects people who had a stroke or those who had an amputation. In the latter case, the memory of the paralysed limb remains intact while the limb no longer exists. Hence the term- phantom pain. Phantom pain is treated with mirror box therapy. Could there be an Ayurvedic explanation for phantom limb syndrome? We offer the following explanation: Usually, phantom limb syndrome results from amputation. This is because amputation only gets rid of the *Sparshanendriya Adhistaana (Tvak)* leaving the *Sparshanendriya Buddhi* intact. This leads to a mismatch between the *Sparshanendriya Buddhi* and the *Sparshanendriya Adhistaana* culminating in phantom limb syndrome. The phantom pain emerges from the *Smriti* of the paralysed limb. Therefore, designing methods that erase this *Smriti* would alleviate phantom limb pain. This is achieved by using the mirror box. Mirror box therapy involves projecting visual feedback that conflicts with *Smriti* (learned paralysis). Mirror box therapy is based on the theory of *Smriti Kaarana*. The *Smriti Kaarana* deployed for mirror box therapy includes *Roopagrahana*, *Saadrusyagrahana* and *Abhyaasa*. Mirror box therapy works by projecting the visual feedback such that the aforementioned *Smriti Kaarana* contradict the *Smriti* of the paralysed limb. The mirror box therapy illustrates the usefulness of *Smriti Kaarana* in treating the diseases of *Indriya* and *Manas* origin.

INTRODUCTION

Phantom limb syndrome is a condition in which patients experience sensations, painful or otherwise, in a limb that does not exist.^[1]

Phantom sensations emerge from the remapping of brain regions in the somatosensory cortex.^[2] As a result, the patient experiences referred sensations from the face in her phantom limb (arm). This is because touching the patient's face activates both the face area and the hand area of the brain.

In atleast 30% of cases of phantom limb syndrome patients complain that they experience pain in their phantom limb.^[3]

This is termed phantom limb pain. Phantom pain originates due to a condition called learned paralysis.^[4]

The Phantom Limbs

Phantom limb syndrome is a condition in which patients experience sensations in a non-existent limb. This occurs in people who opt for amputation after sustaining injuries in their arms or legs or after suffering from chronic paralysis.

In an attempt to get rid of the excruciating pain patients get their arms amputated.

The problem with amputation is that the patient gets rid of the physical arm while the arm's brain areas remain intact in the somatosensory cortex. This mismatch leads to the patient developing phantom limb syndrome- a disease, where the mental image of the amputated arm is misunderstood by the brain as the real arm.

Access this article online

Quick Response Code



<https://doi.org/10.47070/ayushdhara.v9i3.971>

Published by Mahadev Publications (Regd.)
publication licensed under a Creative
Commons Attribution-NonCommercial-
ShareAlike 4.0 International (CC BY-NC-SA 4.0)

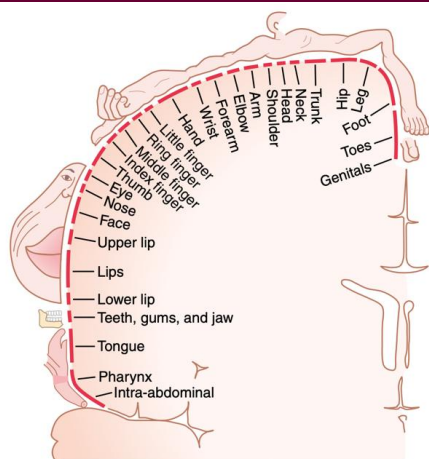


Figure-01: Representation of different areas of the body in the somatosensory area 1 of the cortex

Source: John E Hall, Michael E Hall, Guyton and Hall Textbook of Medical Physiology, 14th Edition, page number 604

Phantom limb syndrome is characterised by both non-painful and painful sensations. Non-painful sensations include the perception of movement and the perception of external sensations. That is – touch, temperature, pressure, vibration, and itch. Pain sensations could range from burning and shooting pain to the feeling of “pins and needles.” [5]

So, what explains the origin of phantom limbs?

Three attempts have been made to uncover the mystery of phantom limb syndrome.[6] They are:

1. Phantom limbs are the result of wishful thinking – This hypothesis doesn't take us too far in understanding the disease. Because, why would someone wish to have a painful limb resurrected?
2. Neuromas (curled up nerve endings) that originally supplied the limb tend to become inflamed and irritated. This idea inspired surgical treatments like rhizotomy to treat phantom limb syndrome. But for most patients, the phantom pain comes back soon after the operation.
3. Phantom limbs/pain arises from the brain regions' remapping in the somatosensory cortex. This happens in two ways – sprouting of nerve fibres from one area of the brain to the adjoining area of the brain. Flaring up of redundant connections after the amputation.

The third explanation is the most widely accepted one. It posits that after the amputation of an arm, sensory input from the face area of the brain begins to invade the hand area of the Penfield homunculus in cortical area S1.[4] (See figure-01)

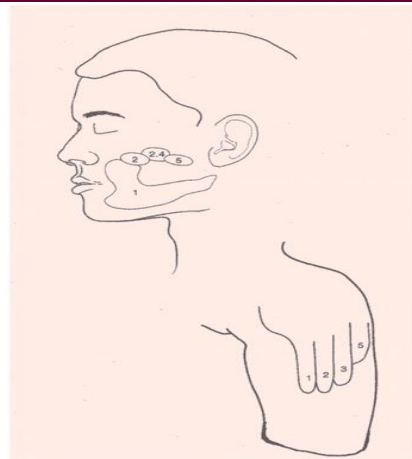


Figure-02: Points on the body surface that yield referred sensations in the phantom hand

Source: Ramachandran, V. S., & Blakeslee, S., *Phantoms in the Brain: Probing the mysteries of the human mind*, 1998

Why do people feel movements in phantom limbs? Two explanations have been put forward. They are:

Sensory signals: In the brain's somatosensory cortex, the face area is right next to the arm area. Post amputation, sensory signals from the adjoining face area invades the area representing the missing arm in the somatosensory cortex.

This means that every time the patient makes movements in her face (let's say the patient smiles) she experiences corresponding movements in her phantom limb.[7] (See figure-02)

Motor signals: Each time the motor command centre sends signals to the missing arm, the information is also sent to the parietal lobe containing the body image. In the absence of the muscle spindles of the missing arm, the parietal lobe continues to monitor the commands and interprets them as movements. But they are phantom movements of a phantom arm.[8]

In at least 30% of cases of phantom limb syndrome, patients complain that they experience pain in their phantom limb. The cause of the phantom pain is said to be a condition called learned paralysis.

Learned paralysis ensues when a patient suffers from chronic pain. In such cases, over some time, the brain gets primed to the fact that sending commands to the paralysed/injured arm causes pain. Amputation doesn't change this hardwiring in the brain. So, when the phantom limb comes back, with it comes the phantom limb pain.[9]

So, how does one treat this pain?

As the source of the phantom pain is the memory of the paralysed/injured limb, getting rid of the memory would eliminate the impetus for pain. This is the basis for mirror box therapy.

In mirror box therapy, the patient is asked to insert her normal arm opposite the mirror, insert her phantom arm (the arm stump) behind the mirror, and move her normal arm while watching the mirror. In the absence of feedback from sensory neurons of the lost arm, the patient feels the movements in the mirror as the movements in her phantom arm. As the phantom arm moves, the patient gets relief from pain.

As the patient uses the mirror box for a few days, both phantom limb and phantom pain disappear. The new memory of the moving arm overrides the previous memory.

Ayurvedic perspectives on phantom limbs

Phantom limb sensations emerge when a part of the *Sparshanendriya Adhishtaana* is lost while the *Sparshanendriya Buddhi* remains intact. The cause of phantom pain is the *Smriti* (memory) of the painful past.

To understand the role of *Smriti* in the genesis of phantom limb syndrome, let's review some of the basics of *Smriti*.

Smriti refers to remembering the stuff which was seen, heard, or experienced. *Smriti* is the knowledge generated from a *samskara* called *Bhaavana*.^[10] The inputs for *Bhaavana* are called the *Udbhodaka Saamaagri*.^[11]

Smriti is formed in three stages called the *Smriti Aadhaara*. *Smriti Aadhaara* are – *Dharanaa* (retention), *Punashchetaana* (recalling) and *Abhijnaanam* (recognising).^[12]

There are eight *Smriti Kaarana*.^[13] The *Smriti Kaarana* are:

1. *Nimitta-Grahana*
2. *Roopagrahana*
3. *Saadrushya-Grahana*
4. *Asaadrushya-Grahana*
5. *Satva-Anubandha*
6. *Abhyaasa*
7. *Jnaana-Yoga*
8. *Punah-Shruti*

Nimitta-Grahana: Perception of the cause helps to recall the memory of the effect. E.g., seeing the flower of a mango tree one remembers the mango fruits. Clouds remind us of the rain.

Roopa-Grahana: Perception of the shape of an object reminds one of another object. E.g., a wild cow (*Gavaaya*) could remind us of a domestic cow (*Go*).

Saadrushya-Grahana: Perception of similarities between objects. E.g., birds of a species build similar nests.

Asaadrushya-Grahana: Perception of dissimilarity between the objects. E.g., seeing a very tall person, one may remember a very short person.

Satva-Anubandha: Conditioning one perception with another perception will cause the memory of the latter even when only the former is perceived. This is due to the conditioned reflex. Salivation due to the memory of the taste on the sight of food is one example.

Abhyaasa: Repetition of an experience many times makes memory easy. E.g., reading a long passage several times makes it easy to remember by heart.

Jnaana-Yoga: Union with knowledge. Obtaining absolute knowledge is said to provide the memory of everything. Here, union with knowledge implies an omniscient state. In day to day life, by having certain knowledge, some related knowledge is remembered.

Punah-Shruti: Hearing again helps recall the memory of a forgotten thing. Here, the complete narration is not required. Hearing only the part may invoke the memory of the whole.

Smriti Kaarana and the learned paralysis:

In the case of phantom limb syndrome, *Smriti kaarana* induce learned paralysis. The *Smriti kaarana* that induce learned paralysis are – *Nimitta-Grahana*, *Roopa-Grahana* and *Abhyaasa*. This happens in the following way:

1. Before amputation, the patient had seen (*Drishta*) and experienced (*Anubhoota*) the pain whenever she tried to move her arm. The attempt to move the arm was the *Nimitta Kaarana*.
2. The absence of movements and the presence of pain were experienced through *Roopagrahana*, and this happened through *Abhyaasa* for months before she finally decided to get rid of the arm.

Praapti-Apraapti Mismatch

According to *Charaka Samhita*, a common cause of *Maanasa Vikaara* is *Ishtasya Alabhaat* and *Anishtasya Labhaat*. Also, *Charaka Samhita* argues that *Maanasika Vyaadhi* could couple with *Shaareerika Vyaadhi* given enough time.^[14]

Phantom limb sensations occur when the *Sparshanendriya Buddhi* experiences *Apraapti* of the desired stimulus (*Ishtasya Alabha*) from the *Sparshanendriya*.

In the absence of a part of the *Sparshanendriya Adhishtaana*, the input-deprived *Sparshanendriya Buddhi* starts to get excited by stimuli from other nearby regions (*Anishtasya labhaat*). Such *Praapti* of the undesired stimuli create the vivid feeling of phantom limbs.

The thing to note here is this– amputation doesn't just remove the arm; it also removes the *Tvak* which was covering the arm. *Tvak* is the

Sparshanendriya Adhishtaana. Therefore, when the *Tvak* is lost, the associated *Sparshanendriya Adhishtaana* is also lost. So, amputation creates a void in the information flow from the *Sparshanendriya Adhishtaana* to the *Sparshanendriya Buddhi*, a kind of blind spot that needs to be “filled-in”.

When *Smriti* Over-rides *Smriti*

Mirror box therapy involves the use of *Smriti Kaarana* as tools to cure the phantom limb.

The mirror box therapy works for the following reasons: The *Anubhava* of using the mirror box contradicts the *Smriti* of the phantom limb. It does so by using the *Smriti Kaarana- Roopagrahana, Saadrusya* and *Abhyaasa*.

For example, the right arm is the mirror copy of the left arm. So, there is *Saadrusya*. The patient is asked to look into the mirror as she moves her normal right arm- this is *Roopagrahana*. The patient is then asked to repeat these movements and practice with the mirror box for a few weeks (*Abhyaasa*).

As the contradictory information from the mirror box evokes new *Smriti*, it also ends up overriding the previous *Smriti* of the paralysed limb. This relieves the person of phantom pain.

Phantom limb syndrome helps us understand the role of *Smriti* in perception. *Smriti Kaarana* has clinical significance. Therefore, understanding the *Smriti Kaarana* could help us design treatments for intractable diseases of *Manas* and *Indriya*.

CONCLUSION

Phantom limb syndrome helps us understand the importance of *Indriya Adhishtaana, Indriya Buddhi* and *Smriti* in *Pratyaksha*. The fact that the mirror box therapy works indicate that our susceptibility to *Aprama* isn't that bad after all. It shows us that illusions could be used as tools to cure diseases of *Manas* and *Indriya* origin. Besides that, it throws new light on the concept of *Smriti Kaarana*.

REFERENCES

1. Rugnetta M. Phantom limb syndrome. Encyclopedia Britannica. September 3, 2020. Available from: <https://www.britannica.com/science/phantom-limb-syndrome>.
2. Ramachandran VS, Rogers-Ramachandran D. Phantom limbs and neural plasticity. Arch Neurol [Internet]. 2000; 57(3): 317–20. Available from: <http://dx.doi.org/10.1001/archneur.57.3.317>
3. Ramachandran V. S., Sandra Blakeslee. Phantoms in the Brain. Fourth Estate, Mariner Books; 1999.
4. Ramachandran VS. Plasticity and functional recovery in neurology. Clin Med [Internet]. 2005; 5(4): 368–73. Available from: <http://dx.doi.org/10.7861/clinmedicine.5-4-368>
5. Subedi B, Grossberg GT. Phantom limb pain: mechanisms and treatment approaches. Pain Res Treat [Internet]. 2011; 2011: 864605. Available from: <http://dx.doi.org/10.1155/2011/864605>
6. Ramachandran V. S., Sandra Blakeslee. Phantoms in the Brain. Fourth Estate, Mariner Books; 1999. p.72
7. Ibid; p.116
8. Ibid; p.117
9. Ibid; p.119
10. Agnivesh C.R. Ayurvedeeya padaartha vijnanaanam. Mannuthy Thrissur. Harishree hospital publication department; 2017. p.327
11. Ibid; p.277
12. Ibid; p.279
13. Agnivesh. Charaka Samhita revised by Charaka and Dridabala with Ayurveda Deepika commentary by Chakrapani Datta edited by Vaidya Jadavji Trikamji Acharya. New Delhi. Chaukhambha Publications; 2017, p.300
14. Ibid; p.254

Cite this article as:

Shakeel H Jamakhane, M.R. Sajjanshetty, B.H. Katti, V.V. Goudar. Phantom Limb Syndrome: An Ayurvedic Perspective. AYUSHDHARA, 2022;9(3):54-57. <https://doi.org/10.47070/ayushdhara.v9i3.971>

Source of support: Nil, Conflict of interest: None Declared

*Address for correspondence

Dr. Shakeel H Jamakhane

Post Graduate Scholar

Department of P.G. Studies in

Samhita & Siddhanta

Sri Vijay Mahantesh Ayurvedic

Medical College and PG Research

Centre, Ilkal, Karnataka, India.

E-mail: shakishu1996@gmail.com

Phone number: 8073812693

Disclaimer: AYUSHDHARA is solely owned by Mahadev Publications - A non-profit publications, dedicated to publish quality research, while every effort has been taken to verify the accuracy of the content published in our Journal. AYUSHDHARA cannot accept any responsibility or liability for the articles content which are published. The views expressed in articles by our contributing authors are not necessarily those of AYUSHDHARA editor or editorial board members.