

Phantom Limb Syndrome: An Attempt to Explore the Concepts of Hetwaabhaasa and Smriti Kaarana

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ABSTRACT

Phantom limb syndrome is a condition in which patients experience sensations, whether painful or otherwise, in a limb that does not exist.¹ Phantom pain originates due to a condition called as *learned paralysis*.² When patients suffering from stroke or those who had road traffic accident undergo amputation, their memory of paralysed limb remains intact while the limb no longer exists. That is, the learned component of paralysis gets transferred to the phantom limb. Could the symptoms of phantom limb syndrome be an example for *Aashraya Asiddha Hetwaabhaasa*? An *Ayurvedic* perspective on phantom limb would be that the phantom sensations originate after the amputation of the limb (*Hastha/Paada*) because amputation only destroys the *Sparshanendriya Adhistaana* i.e., *Tvak*, while leaving the *Sparshanendriya Buddhi* intact. This, coupled with the *Smriti* of the paralysed limb, leads to phantom limb pain. As the source of the pain is the *Smriti* of the paralysed limb itself, designing methods that erase this *Smriti* would alleviate the phantom limb pain. This is achieved by using the mirror box. Mirror box therapy involves projecting visual feedback (moving the normal arm while watching the mirror) that conflicts the earlier *Smriti* (learned paralysis). Mirror box therapy works because it uses *Smriti Kaarana – Roopagrahana, Saadrusya* and *Abhyaasa* that contradict the earlier *Smriti* of the paralysed limb. The use of mirror box to cure phantom limb pain demonstrates that *Smriti Kaarana* could be a useful tool to cure diseases of *Indriya* and *Manas* origin.

KEYWORDS: *Phantom limb syndrome, learned paralysis, SmritiKaarana, Prapti-Aprpti mismatch*

INTRODUCTION

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

Phantom sensations arise from the remapping of brain regions in the somatosensory cortex.³ Thus, the patient experiences referred sensations from face to the phantom limb.

For example, in the case of a patient with a phantom arm, touching the patient's face activates both the face area and hand area of the brain. This makes the patient experience sensations in the phantom limb – whenever the face is touched/moved.

In at least 30% of cases of phantom limb syndrome, patients complain that they experience pain in their

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phantom limb.⁴This is termed as phantom limb pain. Phantom pain originates due to a condition called as learned paralysis.²

An *Ayurvedic* perspective on phantom limb syndrome is that it is a disease where a part of the *Sparshanendriya Adhishtaana* is lost while the *Sparshanendriya Buddhi* remains intact.

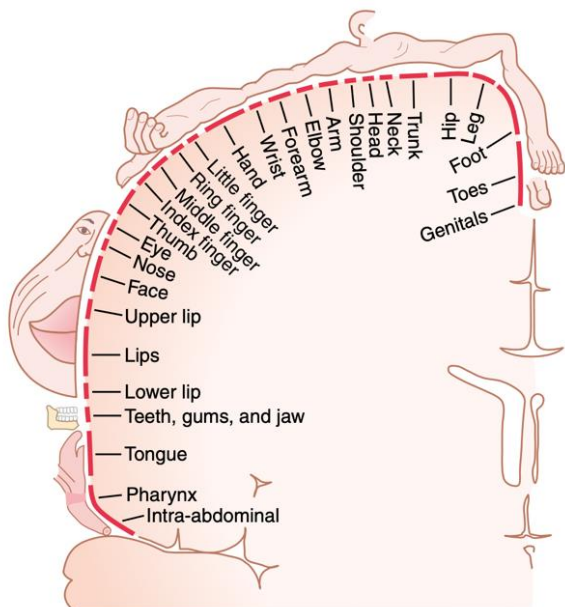
Phantom Limbs – The Enigma

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

Basically, these are the patients who sustained injuries in their arms or legs during a road traffic accident or it could also be patients who suffer from

chronic paralysis. In an attempt to get rid of the excruciating pain, either because of injury or because of paralysis, patients get their arms amputated.

The problem with amputation is – the patient gets rid of the physical arm while the brain areas representing the arm 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.



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

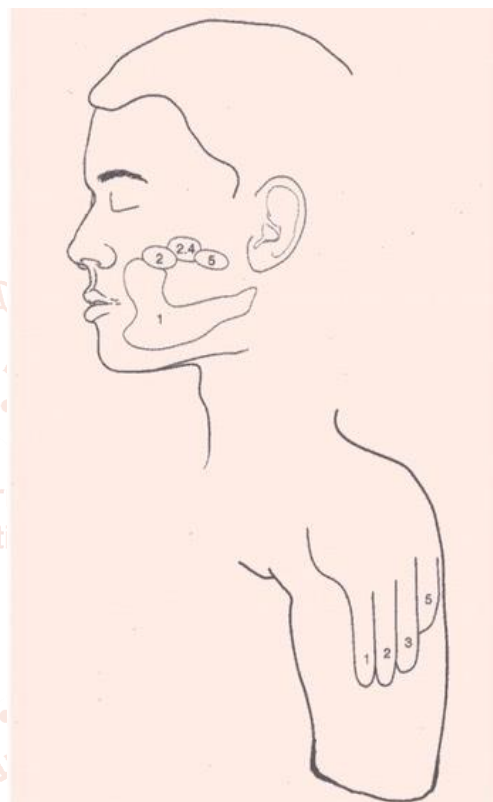
Phantom limb syndrome is characterised by both nonpainful and painful sensations. Nonpainful sensations can be divided into the perception of movement and the perception of external sensations (exteroception), including touch, temperature, pressure, vibration, and itch. Pain sensations range from burning and shooting pains to feelings of tingling “pins and needles.”⁵

So, what explains the origin of phantom limbs? Three explanations are put forward to explain the condition 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 arm resurrected?
2. Neuromas (curled up nerve endings) that originally supplied the hand tend to become inflamed and irritated. This is one of the popular explanations for the phantom limb sensations. This idea has also been an inspiration for surgical procedures like rhizotomy that are used to treat phantom limb syndrome. But for most of the patients the phantom pain comes back soon after the operation.

3. Phantom limbs/pain arise from the remapping of brain regions 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. It could also be that there were redundant connections that flared up after the amputation.

The third explanation is regarded as the most widely accepted hypothesis. The idea here is that after amputation of an arm, sensory input from the face area of the brain begins to activate the hand area of the Penfield homunculus in cortical area S1.²



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 are put forward – Sensory and motor.

Sensory signals: When one looks at the somatosensory cortex of the brain, she sees that the face area is right next to the arm area. Sensory signals from the adjoining face area invade the area representing the missing arm in the somatosensory cortex.

This means that every time the patient makes movements in his face (let’s say the patient smiles) he experiences corresponding movements in his phantom limb.⁷

Motor signals: Each time the motor command centre sends signals to the missing arm, information about the commands is also sent to the parietal lobe

containing our 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 carried out by a phantom arm.⁸

In at least 30% of cases of phantom limb syndrome, patients complain that they experience pain in their phantom limb. Why does that happen?

The cause for the phantom pain is said to be a condition called learned paralysis. Which is that, patients who got their arms or legs amputated to get rid of the pain, had suffered from the pain long enough that the brain of these patients had learned that sending commands to the arm causes pain. This learning was not destroyed by the amputation. So, when the phantom limb came back, with it came 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 the mirror box therapy, the patient is asked to insert his normal hand opposite to the mirror and insert his phantom arm (which is the arm stump) behind the mirror, and move his 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 his phantom arm. As the phantom arm moves, the patient gets relief from pain.

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

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

Smriti refers to reminiscence of the experiences which are seen, heard or experienced. *Smriti* is the knowledge generated from a *samskara* called as *Bhaavana*.¹⁰ The stimulants that cause *Bhaavana* are called as *Udbhodaka Saamaagri*.¹¹

Smriti are formed in three stages called *Smriti Aadhaara*. *Smriti Aadhaara* include – *Dharanaa*

(retention), *Punaschetanaa* (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 cause helps to recall the memory of the effect. E.g., seeing the flower of a mango tree one remembers the mango fruits. Rain clouds remind us of rain.

Roopagrahana: Perception of shape of something helps recall the memory of another things. E.g., memory of horse on seeing a zebra. On seeing a wild cow (*gavaaya*) domestic cow (*go*) is remembered.

Saadrushya-Grahana: Perception of likeness or similarity of one thing with another thing instigates the memory of the latter. E.g., seeing the son with the likeness of father, one is prompted to remember the father.

Asaadrushya-Grahana: Perception of dissimilarity of one thing with another thing instigates the memory of the latter. E.g., seeing a very lean person, one may remember a very fat person.

Satva-Anubandha: Conditioning of 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 sight of food is one example.

Abhyaasa: Repetition of an experience several 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 the 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 forgotten thing. Here, complete narration is not required. Hearing only the part may invoke the memory of the whole.

***Smriti Kaarana* and the learned paralysis:**

Smriti kaarana cause the learned paralysis. The *smriti kaarana* involved are – *Nimitta-Grahana*, *Roopa-Grahana* and *Abhyaasa*. This is how it works – before amputation, the patient had seen (*Drishta*) and

experienced (*Anubhoota*) the pain whenever he tried to move his arm. The attempt to move the arm was the *Nimitta Kaarana*, the absence of movements and the presence of pain were experienced through *Roopagrahana*, and this happened through *Abhyaasa* for months before he finally decided to get rid of the arm.

Praapti-Apraapti Mismatch

According to *Charaka Samhita*, a common cause of *Maanasa Vikaara* is *Ishtaysa Alabhaat* and *Anishtasya Labhaat*.

Phantom limbs result when *Sparshanendriya Buddhi* experiences *Apraapti* of desired stimulus (*Ishtasya Alabha*) from *Sparshanendriya*.

In the absence of a part of the *Sparshanendriya Adhistaana*, the input deprived *Sparshanendriya Buddhi* starts to get excited by stimuli from other nearby regions. Such *Praapti* of undesired stimulus creates the vivid feeling of phantom limbs.

The thing to remember 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, the loss of *Tvak* is the loss of *Sparshanendriya Adhishtaana*. 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 Overrides Smriti

Mirror box therapy involves using the *Smriti Kaarana* and *Viparyaya* as tools to cure the phantom limbs.

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

For example, we know that 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 the patient moves his normal right arm – this is *Roopagrahana*. And the patient is asked to repeat these movements and practice with the mirror box for a few weeks which is *Abhyaasa*.

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

Thus, understanding the role of *Indriya Adhishtaana* and *Indriya-Buddhi* could help us infer the possible ways in which diseases could emerge, and the ways in which such conditions could be treated. The case of

the phantom limb also shows us the clinical implications of studying *Smriti Kaarana*.

Phantom limb syndrome: An example for Aashraya Asiddha Hetwaabhaasa?

Nyaaya system identified five fallacies of reason – *Hetwaabhaasa*. A fallacy of reason is that which appears as a reason but is not. It is a false reason or a defective reason. One among such fallacies of reasons is *Asiddha Hetwaabhaasa*. *Asiddha Hetwaabhaasa* is characterised by claims that are backed by unestablished reasons. One of the *Asiddha Hetwaabhaasa* that is of relevance for phantom limb syndrome is the *Aashraya Asiddha Hetwaabhaasa*.

Aashraya Asiddha Hetwaabhaasa refers to the condition when the *Hetu* becomes invalid because the *Paksha* is non-existent. Phantom limb syndrome is an example for *Aashraya Asiddha Hetwaabhaasa* because the *Aashraya* for pain (in this case the limb of the person) is non-existent. The person complains of pain. But the pain is in the non-existent limb.

CONCLUSION

Phantom limb syndrome shows us the role of *smriti* in how we perceive the world – both *Sukha* and *Dukha*.

The fact that we are susceptible to *Aprama* is a boon. We can create illusions that help us cure diseases of *Manas* and *Indriya* origin.

Smriti Kaarana have clinical significance. Understanding the *Smriti Kaarana* could help us design treatments to intractable diseases of *Manas* and *Indriya*.

Similarly, understanding the concepts of *hetwaabhaasa* could help us diagnose diseases as the errors of judgement. Treating a disease becomes easy when we know the causes for its manifestation. Because what gets measured gets managed.

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