

PHANTOM PHENOMENA & PAIN MANAGEMENT IN AMPUTEE REHABILITATION

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The strange phenomena of phantom limb sensation has been known for centuries and there is evidence of it being reported by Ambroise Pare in 1552 and described extensively by Charles Bell in the 18th Century. However, it was Silas Weir Mitchell, a Neurologist who first used the term 'phantom' in fiction rather than in scientific literature in 1871. Lord Nelson is reputed to have said that his phantom was a direct proof of the existence of the soul. If an arm can survive physical annihilation, why not the entire person? With recent scientific developments, Neuro-physiologists and Neuro-psychologists have once again raised the question of whether phantom sensation is just a clinical curiosity or whether it provides further insight into the mind.

Various terms have been used in relation to phantom phenomena. There are 4 distinct clinical entities recognised and it is important to differentiate between them. A *phantom limb* is defined as any kind of sensation of the missing limb, except pain. *Phantom pain* is defined as painful sensations referred to the missing limb and *stump pain* is any pain at the site of an extremity amputation. It is not uncommon for amputees to describe a sharp shooting neuralgic type of pain in the stump as phantom pain, even though there is no radiation of pain into the phantom limb. A fourth entity known as *super added phantom* is also recognised. It is often the feeling of an object on the phantom limb without actual sensation of the phantom limb. Examples include the feeling of a wristwatch or rings on the fingers. More recently, a fifth entity may be described as *referred phantom sensation*. This is the feeling of a phantom limb when a stimulus is applied to another part of the body. Thus Ramachandran, a Neuro-psychologist in California described patients who had phantom sensation in their thumb and fingers when shaving or otherwise stimulating specific areas on their face. This phenomenon has stimulated further interest in the subject and many consider that it may well have answers to future treatment modalities for phantom pain.

Scientific literature has reported the incidence of phantom limb sensation ranging from 54% to 100%. In our experience at Stanmore, the prevalence is around 68%. The incidence of phantom pain is even more varied, ranging from 2% to 97%. We believe that the difference is possibly due to the different designs of the studies and definitions used especially in questionnaires with many individuals reporting phantom sensation or neuralgic stump pain as phantom pain. The time since amputation is also important as the natural history shows that symptoms of phantom pain decrease in intensity and frequency over a period of time.

Most individuals are aware of the simple phantom sensation of the presence of a limb, either full or shrunken or with a feeling only of the distal end like the hand with the forearm missing. Sensations like pins and needles, itching and change of temperature are common, with a feeling of movement being reported by many. However, rarer symptoms like phantom sensation when yawning or urinating are rarer and often confusing or worrying to the patient. These are not sinister and should be recognised as part of the phenomena. It is easier to understand it if one studies the phenomena described by Ramachandran. In the brain, the area that represents the face is adjacent to the hand. Thus, if an individual loses the hand, the part of the brain that represented the hand is "invaded" by the adjacent area, which in this case would be the face. Stimulation of the face therefore recreates sensations in the hand. This is known as 'neuroplasticity' and phantom pain is often attributed to this phenomena and subsequent disorganisation in the cortex of the brain. It has also been argued that if this re-organisation can be reversed, it would relieve the symptoms of phantom pain.

Fortunately, the incidence of phantom pain is decreasing. Various factors including improved peri-operative management have contributed to this. Significantly, improved management of pain, before and after amputation has been shown to be beneficial. Thus, the use of epidural analgesia started 24 hours before and continued for 3 days after amputation has been shown to reduce the incidence of phantom pain from 30% to 10%. Improvements in the quality of amputation stump have also been beneficial as it is recognised that phantom pain and stump pain are significantly more common in presence of stump problems. Certain types of pain in the stump remain extremely difficult to manage. Chronic regional pain syndrome (CRPS Type 2), which was previously known as Causalgia, presents with localised burning pain and extreme sensitivity and is associated with nerve injury, can also be seen in amputation stump. Reflex sympathy dystrophy (RSD) is also extremely difficult to manage. Occasionally an amputation is required for this condition but it should be noted that there is a very high incidence of recurrence of RSD symptoms in the amputation stump and that most amputees, while satisfied with the amputation improving their quality of life, tend not to use the prosthesis in the long term.

Various descriptions have been given of the symptoms of phantom pain. The commonest description is of a sharp, shooting, stabbing or burning pain but terms like throbbing, cramping, aching, heavy, tender, splitting have also been used. Often patients describe it in considerable detail and it is not uncommon for the symptoms to be similar to the symptoms that they experienced before the amputation. There are various aggravating and relieving factors and some of them, like change in temperature or prosthetic wear can increase or decrease the phantom pain. Typically however, phantom pain is commoner without the prosthesis on and often worse at night. It is useful to identify aggravating and relieving factors as they could play a recognised part in treatment. Though there is no evidence that psychological factors can cause phantom pain, emotional distress and physical illness can aggravate the symptoms of phantom pain and it is generally seen that patients who received less support before the amputation, tend to have more phantom limb pain. Thus, pain management clinics use psychological techniques like distraction, relaxation, imagery and bio-feed back techniques in the management of phantom pain and stump pain symptoms.

Management of pain following amputation can be extremely difficult. In America, Sherman in 1980 showed that there were 68 different treatment modalities. Ros Ham in a similar study in the UK showed in the early 90's that there were over 45 different treatment modalities used. This in itself confirms that there is no single treatment method that has universally good results.

The various treatments used for phantom and stump pain include pharmacological, physical, psychological and surgical methods. Perhaps the commonest first line treatment is pharmacological with the use of simple painkillers, anti-convulsants and anti-depressants or stronger non-narcotic analgesics. Most commonly used drugs are the anti-convulsants (Carbamazepine or Gabapentin). It should be noted that these drugs need to be taken on a regular basis rather than only after the onset of pain as one may take analgesics. Similarly patients should note that the dose used when anti-depressants are prescribed for neuropathic pain is significantly lower than when the same drug is used as an anti-depressant. At lower doses these drugs have been shown to have pain-relieving effects. Blood tests are often required to monitor any potential side effects.

Physical methods used include physiotherapy, massage, TENS machine or acupuncture. Magnets have been used for decades but more recently have been popularised by certain manufacturing companies who have designed special liners or socks and initial studies have been promising. At Stanmore DSC we are currently conducting a double blind study, hopefully to replicate results of a similar currently unpublished study in Germany. Not many of the treatments for pain show a statistically significantly better than placebo result and hence we must welcome properly conducted scientific trials.

Rarely, surgical intervention may be necessary. While excision of a neuroma or revision of a stump is not uncommon, physicians recognise that a cut end of a nerve will always tend to form a neuroma, however small and surgery is indicated only when it has been shown that the neuroma is responsible for the pain. Very rarely, more complex procedures like implantation of pain stimulators may be required.

Recent research has shown that ongoing stimulation, muscular training and visual feedback from the prosthesis might leave a beneficial effect on symptoms of phantom limb pain. This can be explained by the theory of neuro-plasticity and cortical re-organisation described earlier in this article. The commonest ways to achieve this is the Mirror Box though in wider practice results have been reported as less satisfactory probably because of the difficulty in creating a mirror box to completely fool the patient's mind. Researches have also shown that the use of a myoelectric prosthesis can prevent cortical reorganisation. Others have shown that therapy sessions involved in training to discriminate electric stimuli applied to the stump also reduced phantom pain by reversing the cortical reorganisation. Thus, a BMJ editorial in 1999 highlighted that the brain re-organisational mechanism may hold the key to management of intractable phantom pain in the future.

Amputation and Phantom Pain can be most distressing and functionally limiting. For the clinician, Management of Phantom Pain remains a challenge. In my opinion Specialist Clinics at the Rehabilitation Centre has distinct advantages over general Pain Clinics which may specialise in other painful conditions like back pain. However, the clinics should have access to all the possible professional disciplines involved in the clinical management. This would represent true multi-professional service and likely to have best results in a condition where the best results may be only slightly better than placebo effect.

For further information please contact the LA directly.

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