

PSYCHIATRIC SEQUELAE OF AMPUTATION: I IMMEDIATE EFFECTS

C.P. MALL, J.K. TRIVEDI, U.S. MISHRA, V.P. SHARMA, P.K. DALAL,
M. KATIYAR, SHRIKANT SRIVASTAVA & P.K. SINHA

ABSTRACT

Twenty-five subjects, who had undergone amputation within last 6 weeks, were studied for psychiatric complications, including phantom limb phenomena. The patients were interviewed on SCID, HRSD and HARS. Out of a total of 25 subjects, 8 (34.6%) developed psychiatric disorders - PTSD and major depression. The whole sample was thus divided into 2 groups-sick and non-sick. Phantom limb was seen in 88% subjects. No significant difference was present between the two groups with regard to presence of phantom, its associated phenomena of pain, telescoping and movement. A statistically significant difference was seen in psychiatric sickness in relation to upper and lower limb.

Key words : Amputation, psychiatric aspects, phantom limb

The psychiatric aspects of amputation have received scant interest and even lesser interest in our country, in spite of accidental injuries being not so uncommon (Shukla et al., 1982a). The commonest psychiatric disorder seen in amputees is major depression. Randall et al. (1945) have reported an incidence of 61% in non-battle casualties, while Shukla et al. (1982a) found depressive neurosis (40%) and psychiatric depression (22%) as leading psychiatric disorders in amputees; only 35% of the total sample in the later study did not show any psychiatric illness.

Kamenchenko & Vorob'ev (1992) have opined that while "...in the acute period following trauma, the patient's status was abnormal personality in nature, being determined by affective and shock reaction in the hyperkinetic and hypokinetic forms. The subacute period is characterized by predominance of post-traumatic stress disorder....".

Phantom limb : First described by Ambroise Pare in the middle of sixteenth century and given its present name by Mitchell (1872), is the feeling of presence of the amputated limb, which may be distorted and in a peculiar position. It is a unique phenomena seen following the amputation of a sensate limb. Such a limb may display pain sensations and /or movements and telescoping. This phenomena has been well studied and reported following amputation (Sunderland, 1968; DeGutteriez-Mahoney, 1970; Carlen et al., 1978; Wilson et al., 1978).

The development of phantom limb is still not clear. While promulgators of psychogenic theory (Randall et al., 1945; Parkes, 1973; Solomon & Schmidt, 1978) attribute it to wish fulfillment resulting from denial of the loss of body part, the neurophysiologists have their own viewpoints. Thus some authors attribute it to irritation of neuroma (White, 1945; Carlen et al., 1978), others suggest it to be a conscious

process, independent of sensory impulses from the periphery, and based on the life-long body schema built from postural, visual and tactile impressions (Jacome, 1978). Melzack (1990) has suggested that neural network, or neuromatrix, subserving body sensations has a genetically determined substrate that is modified by sensory experiences. Katz (1992) has categorically denied existence of a psychological causation of phantom limb, rather, in his opinion, it is determined by a complex interaction of inputs from the periphery and widespread regions of the brain responsible for sensory, cognitive and emotional processes. Pain and other paraesthesiae experienced in phantom limb are somatosensory memories of sensations felt in the limb after the injury but before amputation (Katz & Melzack, 1990), and are purported to be mediated by a sympathetic efferent somatic afferent cycle (Katz, 1992).

The development of phantom seems to be related to the significance of the lost limb. Hence, movements and telescoping have been observed more frequently in upper than in lower limbs by Carlen & colleagues (1978), and phantom developed in all cases of right upper limb amputation in right-handed persons in the series of Shukla *et al.* (1982b).

The present study was undertaken with the aim of studying the psychiatric problems, especially phantom limb phenomena, in the immediate post-amputation period.

MATERIAL & METHOD

The sample consisted of consecutive patients who underwent amputation of limb (s) within last 6 weeks, and admitted on specified beds in the Departments of Orthopedics, and Physical Medicine & Rehabilitation, K.G. Medical College, Lucknow, on specified beds. Patients of either sex between age range of 16-55 years were taken up for the study. This restriction on age was considered as those who were very young might have problems in understanding the questionnaire, and those who were older may be having organic mental

disorder which would obtrude on the assessment scales.

The patients finally included were administered Structured Clinical Interview of DSM-III-R (SCID) (Spitzer *et al.*, 1989), Hamilton Rating Scale for Depression (HRSD) (Hamilton, 1960) and Hamilton Anxiety Rating Scale (HARS) (Hamilton, 1959).

On an average, hospitalization following amputation was for 6 weeks. The patients were first contacted at least 2 weeks after the operation, so that the initial pain and agony of the procedure may have subsided, or at least diminished to a significant extent. The rating scales were administered over 3 to 4 sessions, as complete evaluation required about 4 hours. Ergo, contact with the patient was maintained upto 6 weeks, i.e. the time the patient was finally discharged.

For the purpose of analysis the whole sample was divided into 2 groups-sick (those in whom a psychiatric diagnosis was evident according to DSM-III-R criteria; APA, 1987), and non-sick (those where no psychiatric diagnosis was evident). Fisher's probability test was used to test the level of significance between these 2 groups.

RESULTS

A total of 31 patients who had undergone amputation of limb (s) were admitted on the designated beds. Out of the 31 patients, 5 were dropped out for various reasons (age < 16 year = 1; age > 55 years = 1; left against medical advice or absconded within 2 weeks of operation = 2; and, uncooperative for evaluation = 1). Thus, 26 subjects were included in the study; the sick group and non-sick group had 9 and 17 patients respectively. The diagnostic breakup of the sick group is shown in table 1; post-traumatic stress disorder (PTSD) was the commonest diagnosis. One patient in the sick group was suffering with schizophrenia before the amputation, hence was dropped from further analysis.

All the patients were male, and majority

PSYCHAITRIC SEQUELAE OF AMPUTATION : I IMMEDIATE EFFECTS

TABLE 1
DIAGNOSTIC DISTRIBUTION (N=26)

Diagnosis	n	%
Post-traumatic stress disorder	8	30.8
Major depressive syndrome*	5	19.2
Schizophrenia #	1	3.8
No psychiatric illness	17	65.4

* All the patients fulfilling the criteria of major depressive syndrome also had post-traumatic stress disorder, hence these 5 patients received dual diagnosis.

The patients suffering with schizophrenia had this illness before amputation and was dropped from further analysis.

were young adults (ages between 16 and 25 years) in both the groups. There was no statistically significant difference between the two groups as regards marital status, religion, education, occupation or socioeconomic status.

Almost all the amputations performed were classified as emergency (92%), and only 8% were classified as elective. In the former category, road accidents were responsible for the largest group of patients (48%) followed by thrasher injury (6%) and brawl/fight (4%). The number of limb (s) amputated is shown in table 2.

TABLE 2
NUMBER OF LIMBS AMPUTATED

	n	%
A. One limb only	24	92.0
-right upper limb	4	16.0
-left upper limb	3	12.0
-right lower limb	11	44.0
-left lower limb	6	24.0
B. Two limbs	1*	4.0

* Bilateral amputation above ankle.

The patients who had amputation of upper limb were more psychiatrically sick as compared to those with lower limb amputation

TABLE 3
SICKNESS IN RELATION TO SITE OF AMPUTATION

Site of amputation	Sick (n=8)		Non-sick* (n=16)	
	n	%	n	%
right limb	5	62.5	10	62.5
left limb	3	37.5	6	37.5
Fisher's probability test : p=0.675, NS				
Upper vs lower limb				
upper limb	5	62.5	2	12.5
lower limb	3	37.5	14	87.5
Fisher's probability test : p=0.020,				

*Patient who had bilateral amputation of lower limbs has been excluded from analysis

(table 3); however, there was no such difference between those who had amputation in right or left side of the body.

Phantom limb : It was present in 92% of the subjects - all patients (n=8) in sick group and 88.2% (n=15) in non-sick group. The associated characteristics of pain, telescoping and movement, although seen more frequently in the non-sick group, did not differ significantly between the two groups (table 4). Phantom was reported more often in right limb (93.3%) than the left limb (88.9%) and in lower (94.7%) than the upper (85.7%) limb; a similar trend was seen

TABLE 4
PHANTOM LIMB PHENOMENA

	Sick (n=8)		Non-sick (n=17)		p-value*
	n	%	n	%	
Present	8	100	15	88.2	0.453, NS
Absent	0	0	2	11.8	
	Phantom in sick group (n=8)		Phantom in non-sick group (n=15)		
	n	%	n	%	
Pain	6	75.0	11	73.3	0.667, NS
Telescoping	2	25.0	9	60.0	0.112, NS
Movement	6	75.0	12	80.0	0.792, NS

* For all values, Fisher's probability test was calculated considering presence and absence for each symptom.

TABLE 5
PHANTOM LIMB IN RELATION TO SITE AND SIDE OF LIMB

	Side of limb				p-value*	Site of limb				p-value*
	Right (n=15)		Left (n=9)			Upper (n=7)		Lower (n=17)		
	n	%	n	%		n	%	n	%	
Present	14	93.3	8	88.9		6	85.7	16	94.7	
Absent	1	6.7	1	11.1		1	14.3	1	5.3	
Fisher's probability test :	p= 0. 620, NS					p=0.924, NS				
	(n=11)		(n=7)			(n=6)		(n=16)		
	n	%	n	%		n	%	n	%	
Pain	11	78	5	62.5	0.369, NS	4	66.7	12	75.0	0.824, NS
Telescopy	6	42.2	4	50.0	0.546, NS	1	16.7	9	56.3	0.119, NS
Movement	11	78.6	6	75.0	0.767, NS	6	100.0	11	68.7	0.166, NS

* Fisher probability test values considering presence or absence for each symptom viz, pain, telescopy and movement

for pain and movement in the phantom also. No statistically significant difference was observed between right vs left side or upper vs lower limb amputations.

DISCUSSION

Amputation is one of most vicious operations known to mankind, not because of agony felt during the procedure, thanks to modern day medical science, but due to permanent disability it results into. Hence, it being viewed as a punitive measure (Shukla *et al.*, 1982a) is not surprising. The resultant disability gives rise to hostility directed towards others, which being unacceptable is repressed and replaced by guilt and/or depression (Kolb, 1964).

Our study sample comprised of patients who were in the intermediate phase following amputation, and of a psychiatric illness is much lower than those reported by Randall *et al.* (1945) and Shukla *et al.* (1982a)- 61% and 65% respectively. However, a possible explanation could be the use of DSM-III-R criteria which are quite stringent, in the present

study.

The commonest diagnosis in our sample was that of PTSD (30%) followed by major depression (20%), while in the study of Shukla *et al.* (1982a)-the only other such study to be reported from India, psychotic depressive reaction (22%) and depressive neurosis (40%) were most prevalent. However, a closer look reveals that, except for the different classificatory system employed in these two studies, the diagnostic spectrum essentially remains the same.

Phantom limb, in our study, developed in nearly four-fifth of the cases, and marginally more on amputations performed on right side of body, and in lower limb. Similarly there is little to choose in the associated phenomena of pain, telescopy and movements, between the side and site of amputation. Shukla & colleagues (1982b) also did not find any significant left/right difference, neither for movement in the phantom as regards to left/right side nor for upper/lower limb. This is in contrast to the findings of Carlen *et al.* (1978) who reported that movement in phantom is seen more often in upper limb than lower limb

PSYCHAIITRIC SEQUELAE OF AMPUTATION : I IMMEDIATE EFFECTS

amputation (69% & 45% respectively); similar is the trend reported for telescoping (62% and 45% respectively) by the same authors.

On the basis of above observations it could be concluded that both group of workers (Shukla et al., 1982b & Carlen et al., 1978) have inferred that more significant is the limb for the patient, more is the phantom limb phenomena. This appears to be an indirect contribution to the psychogenic etiology of phantom limb. However, our results seem to favour the neurological hypotheses, although it cannot be commented upon categorically.

REFERENCES

- American Psychiatric Association (1987)** Diagnostic and Statistical Manual for mental disorders, Edn.3rd (revised), Washington DC : American Psychiatric Association.
- Carlen, P.L., Wall, P.D., Hadvorna, M.D. & Steinbach, T. (1978)** Phantom limb and related phenomena in recent traumatic amputations. *Neurology*, 28, 211-217.
- Cronholm, D. (1978)** Phantom limb in amputees. *Acta Psychiatrica Neurologica Scandinavica*, 72 (Supp), 1-310/
- De Gutierrez-Mahoney, C.G. (1970)** The treatment of painful phantom. *Surgical Clinics of North America*, 28, 705-708.
- Hamilton, M. (1959)** The assessment of anxiety states by rating, physiology and treatment. (Ed) Thomas, Charles C., Illinois : Springfield.
- Hamilton, M. (1960)** A rating scale for depression. *Journal of Neurology, Neurosurgery & Psychiatry*, 23, 56-62.
- Kamenchenko, P.V. & Vorob'ev-vlu (1992)** Mental disorders after amputation of the extremities. *Zh. Nevropatol. Psychiatry*, 92, 74-78.
- Katz, J. & Melzack, R. (1990)** Pain memories in phantom limb : Review and Clinical observations. *Pain*, 43,319-336.
- Katz, R. (1992)** Psychophysiological contributions to phantom limb. *Canadian Journal of Psychiatry*, 37, 282-298.
- Kolb, L.C. (1964)** The painful phantom: Psychology, Physiology and Treatment. (Ed.) Thomas, Charles C., Illinois : Springfield.
- Melzack, R. (1990)** Phantom limbs and the concept of neuromatrix. *Trends in Neurosciences*, 13, 88-92.
- Mitchell, S.W. (1872)** Injuries of nerves and their consequences. J.B. Lippincott : Philadelphia.
- Parkes, C.M. (1973)** Factors determining the persistence of phantom pain in amputees. *Journal of Psychosomatic Research*, 17, 87-108.
- Randall, G.C., Ewalt, J.R. & Blair, H. (1945)** Psychiatric reaction of amputation. *Journal of American Medical Association*, 128, 645-652.
- Shukla, G.D., Sahu, S.C., Tripathi, R.P. & Gupta, D.K. (1982a)** A psychiatric aspects of amputees. *British Journal of Psychiatry*, 141, 50-53.
- Shukla, G.D., Sahu, S.C., Tripathi, R.P. & Gupta, D.K. (1982b)** A phantom limb : A phenomenological study. *British Journal of Psychiatry*, 141, 54-58.
- Soloman, G.F. & Schmidt, K.M. (1978)** A burning issue. Phantom limb pain and psychological preparation of the patient for amputation. *Archives of Surgery*, 113, 185-186.
- Spitzer, R.L., Williams, J., Gibbon, M. & Michael, B. (1989)** Structured interview for DSM-III-R (SCID, 5/1/89 revision). Biometrics research dept., New York State Psychiatric Institute : New York.
- White, J.C. (1945)** Pain after amputation and its treatment. *Journal of American Medical Association*, 124, 1027.
- Wilson, P.R., Person, J.R., Su, D.W. & Wang, J.K. (1978)** Herpes Zoster reactivation of phantom limb pain. *Mayo Clinic Proceedings*, 53, 336-338.

C.P. MALL¹, MD, Psychiatrist, J.K. TRIVEDI², M.D, Professor, U.S. MISHRA², MS, M.Ch., FRCS, Prof & Head (Retd.), V.P. SHARMA³, MS, DNB, Assoc. Prof., P.K. Dalal, M.D, Assoc. Prof., M. Katiyar, MD, Assoc. Prof. SHRIKANT SRIVASTAVA, MD, Senior Resident, P.K. SINHA, MSc., DSQC., Senior Statistician, Department of Psychiatry, K.G.'s Medical College, Lucknow. ¹Medical Officer, Provincial Medical Services, Basti, ²Department of Orthopedics, ³Department of Physical Medicine and Rehabilitation, K.G. Medical College, Lucknow.

*Correspondence