Original Article

Phantom Limb and pain after traumatic lower extremity amputation.

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Summary:

Background: Pain after amputation is a common squeal, patients often have a phantom limb sensation too, which can be painful or painless.

Objectives: This study describes the sensations and pain reported by patients after traumatic amputation of unilateral lower limb as well as the incidence and epidemiology of those sensations.

Patients and methods: A retrospective study of 118 patients who underwent lower limb amputation due to trauma. Patients scheduled for interview by means of a standard questionnaire and examined, days, weeks, months, years, after surgery about limb pain, phantom limb sensations, stump pain, back and shoulder pain.

Results: Statistical analysis revealed that the incidence of non-painful sensation was the commonest and more frequent than phantom limb pain. Back pain disturbing the amputee more than phantom limb pain. Phantom pain was significantly less common in patients with below knee amputation than above it.

Conclusion: Phantom limb pain and shoulder and back pain problems warranting further clinical attention and analysis.

Key word: phantom limb. lower limb amputation . residual limb pain.

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Introduction:

Bouts of pain after limb amputation is a common sequel , it often becomes chronic and limits the life and the functional capacity. Jensen et al (1) referred to this pain as residual limb pain ,and defined by Legro et al (2) as pain perceived as emanating from the residual portion of the limb (the stump) , whereas phantom limb pain as painful sensation perceived in the missing body part. Available litterateurs did not focus on the non painful sensation (in the missing limb) , neither the frequency or, intensity , how far it disturbs the patient's mode of life.Phantom limb pain has been reported more common than residual limb pain (R.L.P) , with prevalence ranging from 0.5%to 100% (3) . It is commonly thought that most persons who undergo limb amputation possibly as many as 85% will experience phantom limb pain (1).Residual limb pain subside significantly in few weeks after being omnipresent immediately after amputation, (Aloeser) (4), Pante (5)and Dedmond(6) did not differentiate between the residual limb pain and phantom limb pain ,contrary to this view Hermann et al (7)who distinguished between the two types found that the percentage of individuals with residual limb pain was 22% at 6 months and 21% at 2 years after amputation .Shermann (8) estimated that phantom limb sensations were experienced by virtually all persons with amputations, whereas Feinberg et al (9) reported a lower incidence (90%) of their prospective sample..Karanikolas et al (10) estimated that between 12% and 95% of the adult population experience low back pain at any time. It is not known that amputees has similar experience.

Aims of the study: to draw clear knowledge about the incidence , clinical effect of phantom limb pain after traumatic amputation particularly and other amputation related sensations , their frequency, time coarse, and does they decrease with time .

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Patients and methods:

From 321 patients who had undergone traumatic lower limb amputation, 118 patients were identified to be included in this retrospective study along period extended from 2004 – 2011 at Orthop. Department of Medical City Teaching Hospital, Baghdad. The inclusion criteria specified that patients (1) six months or more post-unilateral amputation at below knee (Symes level ,ankle disarticulation included) or higher at hip or hindquarter level. (2) use a fitted prosthesis minimally 3 days a week. (3) reasonable level of education (primary school level at least) or mental state to answer the questionnaire in the form provided at six months and longer after amputation , bilateral or prescheduled amputation due to diabetes or vascular insufficiency or pathology other than acute traumatic reason for surgery were excluded.The evaluation questionnaire included ten items related to localization of pain, and ten items to the term used to identify the kind of sensation , and ten items to assess the frequency , intensity , disturbance effect of non painful phantom sensation , phantom limb pain or residual limb pain , and back pain. In addition to an enquiry by six items relating to feeling of a limb existence or movement i.e acts on believe that the limbs still (fall , tripped , night mares and dreams) how long the feeling remained after amputation , medications used if any. Phantom limb was defined as the portion of the limb that was amputated or missing. Non painful limb sensation as sensation in the missing limb that was not painful. Phantom limb pain as painful sensation in the phantom limb , whereas residual limb pain referred to, pain in the portion of the amputated limb that was physically present (stump). Back pain include low , mid and upper back pain, ipsilateral or contralateral shoulder pain , when appropriate correlational analysis ,(Chi square), were used to explore

association between variables .

Results:

Descriptive analysis was conducted on the 118 participants, results of which can be seen in table (1).

Table (1): Patients characteristics

1.Patients age (years)	No	%
20-40	43	36.4%
40-60	64	55%
> 60	11	9.3%
2. sex		
Male	97	69%
Female	21	18%
3. level of amputation		
Below knee	38	32%
Above knee	72	61%
Hip disarticulation	5	4.2%
Through knee	1	0.8%
Syme	2	
4. Time since amp.		
0-1y	12	10.2%
1-3	19	16.1%
5y	31	26.2%
> 5y	56	
5. Reason for amp.		
War injuries	62	48%
R.T.A	20	16.9%
Major crush	36	32%
6. Marital status		
Single	26	22%
Married	72	61%
Widow , divorced	20	16.1%
7. Educational level		
Primary school	30	25%
Secondary school	64	54%
University or higher	8	7%
Illiterate	16	11%
8. Work status		
Employed	56	47%
Jobless	41	35%
Student	11	٪٩
Miscellanies	10	8%
9. Co morbidities		
Vascular	13	12%
Diabetes	8	7%
Hypertension	20	19%
Others	3	3%

Male patients formed the majority (97 patients) 82%, war or (cross-fire) victimes 58% (60 patients) ,18% were female (21) patients. Patients age range 20 – 80year (mean 32 y) (standard deviation 12.9), non employed (civil) were for reason that included being retired 43%, disabled 4.2%, 72% reported education level above primary school, 5.2% at or after universities. Road traffic accidents 20 patients (16.9%), explosion (car bomb) 9 patients and 13 patients various causes of accidents or trauma.The commonest level of amputation was above knee (63%),transtibial(25%) , , hip disarticulation in five patients (4.2%) and two Symes amputation (1.6%). The range of time post-trauma until stump closure range 1 – 28 days , including multiple wound excisions or stump remodeling (mean 16 days)standard deviation (15.3),31% of patients had their amputation within the last three years while 79% had their amputation at or more than seven years. Participants rated their experience with the intensity from (0) or non – painful to painful sensation, its location, and the frequency which range from nil(0)to all the times (5) score. Analysis showed that 83.2% of patients reported to have non – painful phantom sensation, additional 61% reported phantom limb pain while 78% experienced residual limb pain,65% of amputees had phantom limb sensation in the entire missing limb , and 73% experienced back pain, and 28% of shoulder pain .Table (2)

Table (2): Localization of most prominent painful phantom limb and phantom pain

localization	< 6	1 year	> 1 year
toes	68	60	
Forefoot	40	21	52
Ankle	20	12	19
Foot+toes+ankle	28	9	6
Stump	38	41	14
Whole limb	17	18	3
Others	3	2	27

How often, the enquiry based at how frequent patients experienced sensations, most of the time , half of the time or nil, it revealed that 54.2% of patients experienced non painful phantom sensation , and 38.1% experienced phantom limb pain , 43% experienced residual limb pain most of the time and 33% suffered back pain for more than 6 months , and then every evening for more than a year , then infrequent all through the last 3 – 7 years. Table (3)

Table (3): Duration and frequency of phantom limb pain in 118 patients after amputation

	No.	%
Duration		
a. < 1 month	15	12.7
b. 1-6 months	75	63.5
c. > 1-6 years	28	23.7
Frequency :-		
a. constant daily	40	33
b. intermittent daily	60	50.8
c. day>s intervals	18	15.2

Non painful phantom sensation experienced by patients is not correlated with the time since amputation. 69% of

patients reported non painful phantom sensation three years post amputation, and phantom limb pain (56%) while residual limb pain 71% and back pain 76%.The intensity of pain and sensation which ranged from extremely mild , mild , moderate and severe , the results were 30% , 52% , 10% , 8% for the severe , p<0.52 , p≤ .73 , p≤ 0.29 , p≤ 0.12 , respectively. Table (4)

Table (4): Rating of types of pain in percentage and grades of intensity

Type of pain	Total No.	Mild%	Moderate%	Sever%
Back pain	82	(26) 31	(25) 30	(31) 39
Stump pain	95	(33) 36	(28) 32	(33) 36
Phantom pain	63	(8) 15	(16) 25	(39) 48
Non-painful sensation	57	(10) 22	(17) 28	(30) 33
Shoulder pain 1.ipsilateral 2. contra lateral			23 36	

The non painful phantom limb sensation were significantly less disturbing than phantom pain (p≤ 0.001), then to lesser extent the residual limb pain (p≤ 0.001). In the group of patients who were with back pain that was the most disturbing than phantom limb (p ≤ 0.59),P ≤ 0,028 respectively ,and the least was the residual limb pain(p≤ 0.079).Table (5) showed the nature of pain as described by the patients.

Table (5): Modalities of phantom pain and sensation experienced by the patients

Term used	Non bothering	%	painful	%
Warm	20	16.9	12	10.2
Hot	11	9.3	19	16.1
Squeeze	40	33.8	28	23.7
Itch	13	11.0	10	8.4
Tingle	52	44.0	31	26.2
Existence	60	50.8	22	18.6
Cramp	27	22.8	35	29.6
Bent	15	12.7	16	13.5
Broken	2	1.6	5	4.2
Sharp	18	15.6	41	34.7

Amputation level and associated back pain as well as the age are factors dictates further to explore the nature of the back pain. One need to compare intialy between below knee (no:28) and above knee amputation (no:65) and the effect on the intensity and frequency and annoyiance of back pain. The results showed that persons with above knee amputations were significantly more likely to have back pain (p≤ 0.046) and greater intensity (p≤ 0.05) and reported more bothering of pain in the back , (p≤ 0.005) than those below knee amputation.
The three patients out of the five with hip disarticulation had complained of phantom limb pain but all have phantom limb sensation and back pain.Age has not significantly correlated with the frequency , intensity or disturbance effect of back pain in this study (p≤ 0.001). (P ≤ 0.11) respectively, table (6) describe the patients actions to relieve the pain.

Table (6): Patients response to relieve phantom pain

Act.	No	٪
Movement of the stump	٢٥	١٢,٧
Use prosthesis	٣٨	٣٢,٢
Elevation	٤٠	٣٣,٨
Stump pressure	١٥	١٢,٧
Change position	١٠	٨,٤
Heat application	١٨	١٥,٢
Cold application	٣	٢,٥
Strucking	٣١	٢٦,٢
Rest	٢٠	١٦,٩

Drug or medication use or abuse reported by the patients in the form of analgesics , narcotics , hypnotics or even alcohol abuse indulgence (for the first time).Ninety-six patient of the study group who reported at least one type of pain , 62% of them reported not using any prescription medications for the pain ,of the 32 participants who did report taking prescriptions , nine patients(40 %) they took it regularly (5 – 6 day / week) three times daily,13 patients(60%) used medication 2-3 days per week ,ten patients occasionally (on need). Nonsteroidal anti- inflamatory medications were the most commonly used (56%) for phantom sensation , 46% for residual limb and 30% for back pain . Narcotic drugs used by 8%, and narcotic combination or opoid in 18% , muscle relaxant in 45% , alcohol for the first time in life in 7%.

Discussion:

This study revealed that persons commonly experienced various types of painful or non painful sensations after lower extremity amputation which might be severe enough to cause debilitation(11). The pain is not limited to the phantom limbs. Our results suggest that non painful phantom sensation were experienced by 83% of our sample , and were more than painful phantom limb. While phantom limb reported by 68%of our study group of patients. The rate of residual limb pain in our study was notably higher than the rate reported by Jensen et al (1)and Shermann et al(8) , who suggested that residual limb pain as common as phantom limb pain. Shoulder or back pain may be an overlooked problem after amputation. (12) It is surprisingly prevalent in our study at 86% in the back and 59% in the shoulder, the former might be attributed to over

use of crutches and not the use of prosthesis , a rate more than what was estimated in the general population according to a report by Wecks et al.(13)Inspite of the fact that ageing is typically associated with occurrence of back pain , analysis in this sample had not explored this association , i.e the age was not significantly correlated with the frequency(p< 0.0) , the intensity(p< 0.11) , or back pain (p<0.11), a conclusion closely correspond with Feinberg et al,(9)Dedmond et al(6) findings.Back pain reported by persons with above knee amputation more frequent , intense and bothering more than persons with below knee amputation . It is more bothering than other types of sensations. This is mostly according to Foel et al(14) and Lovimer et al(3) connected with emotional or provocative distruptive as well as enviromental or even weather changes factors rather than biomechanical imbalance of the body physique. However Probstner et al (15) described back pain after amputation as a complex and multidimensional in nature.In the current study 56% of patients were unable to distinguish between all the three types of pain, neither the intensity , frequency, this might be attributed to level of education or past personal life experience, and above all the jobs or life style previously practiced and closely related to psychological and emotional factors.A significant finding that those sensations were least in the patients with hip disarticulation , an explanation been given due to large loss of target and erasion of major presentation from the cerebral cortex, therefore there is deafferentiation to the central nervous system mainly to the thalamic nuclei(5).In the present study the non painful sensation persisted 1 – 7 years after amputation , while painful sensation decreased with time from 4 – 8 months after amputation, although Skolnick et al (12) thought that those non painful persisted ten years or more , but the intensity and disturbance of sensation did not decrease with time.Over the first year after amputation many patients experienced a phenomenon referred to as «» telescoping»» where by the phantom limb gradually shortens to the end of the residual limb , similarly 12% of patients experienced feeling of cotton rapped foot.In a survey conducted by Wecks et al(2010)(13) more than 50 different methods of treatment and acts to deal with the sensation or the pain were in use , although no one specific method is universally beneficial , a sizable minority of the patients reported using over the counter pain medication more than prescribed drugs for phantom limb pain.Some alteration in parameters been undertaken in this study for non painful limb sensations in a form of five categories of actions performed by the patients depending on his believe of still limb existed urging him to (1)catch the foot (the missed one) (2)itch or(3)feeling of toes moving or(4) fall or (5)tripped at getting up in the morning from bed , a percentage gained as follow 92% , 81% , 60% , 9% , 5% respectively.Caution warranted regard back pain in persons who did not use prosthesis , most of the day , all the week , all the time , therefore no study group regarded as good representative of all persons with amputation.

A significant finding for the phantom painful limb incidence in our study in relation to the timing of amputation after the accident as follow (1) at field (2) at hospital (3) 1- 5days after trauma (4) multiple surgeries wound excisions or debridement(remodeling of stump included). The result showed that the earlier the amputation the fewer surgeries the less the rate of painful and non painful sensation , a finding supported by several authors.(16)(3) .The above results of this study have several important implications for health care providers to focus not only on phantom limb pain but also to assess and treat other types of amputation related pain namely the residual limb and back and shoulder pain.In this study data suggested pain may persist for years a conclusion supported by many authors and in several litterateurs. Which indicate in turn to the issues of health care by professional bodies which must be careful not foster unrealistic expectations in their patients by informing them their pain will resolve with time . Lovimer et al((16).Weiss(17)The hypothesis which could be tested is that back pain may result from gait mechanics developed to accommodate prosthesis , but in those patients who did not used it , it is thought to be due to leaning of the body to opposite side for balance which may throw burden on the lower spines, so care should be given to review gait modifying prosthesis , training and retraining for minimizing the gait pattern , similar care to look after the other locations of pain (hip , knee , shoulder). Residual limb pain warrants attention for fitness of the prosthesis to the stump e,g crests , neuroma, folds , skin condition. Further more researchers should assess exactly all components of pain , it>s intensity , temporal pattern , psychology of the patients, their return to their jobs , or off it , and the effect of amputation on their functional activities and general health.

Conclusion:

This study revealed that non painful limb sensation were more common than phantom limb pain and it may persist years (up to 7-10 years) after amputation. Shoulder and back pain are amputation related pain s were found annoyed and change the patient life emotionally and pschycologicaly more than all types of phantom limb sensation.

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