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Pain in traumatic upper limb amputees in Sierra Leone

Philippe A. Lacoux[a,b], Iain K. Crombie[c], William A. Macrae[b,*]

[a]Medecins Sans Frontieres, 8, Rue St. Sabin, Paris XI, France
[b]The Pain Service, Ninewells Hospital and Medical School, Dundee DD1 9SY, Scotland, UK
[c]Department of Epidemiology and Public Health, University of Dundee, Ninewells Hospital and Medical School, Dundee DD1 9SY, Scotland, UK

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Abstract

Data on 40 upper limb amputees (11 bilateral) with regard to stump pain, phantom sensation and phantom pain is presented. All the patients lost their limbs as a result of violent injuries intended to terrorise the population and were assessed 10–48 months after the injury. All amputees reported stump pain in the month prior to interview and ten of the 11 bilateral amputees had bilateral pain. Phantom sensation was common (92.5%), but phantom pain was only present in 32.5% of amputees. Problems in translation and explanation may have influenced the low incidence of phantom pain and high incidence of stump pain. In the bilateral amputees phantom sensation, phantom pain and telescoping all showed bilateral concordance, whereas stump pain and neuromas did not show concordance. About half the subjects (56%) had lost their limb at the time of injury (primary) while the remainder had an injury, then a subsequent amputation in hospital (secondary). There was no association between the incidence of phantom pain and amputation irrespective of being primary or secondary.

Keywords: Amputees; Developing world; Phantom pain; Neuromas; Stump pain

1. Introduction

The West African country of Sierra Leone (population 4.5 million) has suffered civil war for 10 years. The complex struggle including coups, a revolutionary group and militias developed into a conflict concerned with power and money, particularly diamonds. Many civilians have been injured and terror was widely used on the population. One means of terrorizing civilians has been limb amputation, particularly upper limb.

Medecins Sans Frontieres (MSF) have been involved in the surgical and ongoing medical care of the population. Murray Town War Wounded and Amputees camp was set up as a place for internally displaced people and their families to live after discharge from the hospital. At the time of the study, the camp housed 153 upper limb amputees (29 bilateral). This camp is in Freetown, the Capital of Sierra Leone, where some of the worst violence had occurred (de Jong et al., 2000). Handicap International (HI), a non-governmental organisation specialising in physiotherapy and prosthetics also have their main centre in the camp. This study investigates the pain suffered by civilians after traumatic upper limb amputation in a civil war setting.

2. Methods

Forty traumatic upper limb amputees with previously healthy limbs were interviewed in May 2000. All were internally displaced civilians, living in the camp, who had been forced to flee their homes due to the conflict. Only two (5%) were from the Freetown District the rest were from other parts of Sierra Leone. Amputations distal to the wrist were not included. Interviews were conducted at the MSF Health Centre 10 months–4 years after the amputation, with an average of 22 months. Random sampling of the amputees in the camp was not attempted in this survey, because this study was planned as an initial assessment and also because of the unstable situation. The study was terminated early due to a deteriorating security situation, which included the kidnapping of several hundred United Nations troops by non-governmental forces.

Structured interviews were conducted through interpreters over a 1-week period. The questionnaire contained sections on: demographics, details of the injury, stump pain, phantom sensation, phantom pain, examination of the limb, rehabilitation, mood and future plans. The interpreters were all Sierra Leonean physiotherapy or prosthetic assistants. During the previous week the interpreters had received three 1-h training sessions about the interview, the questionnaire and aspects of pain. Before the structured interview,

* Corresponding author. Tel.: +44-1382-660111.
E-mail address: w.a.macrae@dundee.ac.uk (W.A. Macrae).

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Table 1
Demographics and amputation details

	Bilateral	Unilateral
Number of amputees	11	29
Male:female	11:0	21:8
Age years (average)	20–55 (41)	16–68 (38.7)
Religion		
Christian	3 (27%)	4 (14%)
Muslim	8 (73%)	25 (86%)
Ethnic origin		
Fullah	1 (9%)	6 (21%)
Karanko	3 (27%)	3 (10%)
Limba	1 (9%)	4 (14%)
Mandingo	1 (9%)	1 (3%)
Mende	1 (9%)	1 (3%)
Temne	4 (36%)	14 (48%)
Amputation site		
Below elbow	22	27
Above elbow	0	2
Amputation		
Primary	14 (64%)	14 (48%)
Secondary	8 (36%)	14 (48%)
Unknown	0	1 (4%)
Months since injury (range)	23.2 (16–47)	21.9 (10–49)
Mean hours to first operation (range)	213 (3–1140)	275 (2–1440)

each amputee had a meeting with a Sierra Leonean nurse to discuss the patient information sheet and to be given an initial explanation about pain scoring, stump pain, phantom sensation and phantom pain. Stump pain was defined as pain in the remaining part of the limb, phantom sensation as feelings, other than pain, in the missing arm or hand and phantom pain as pain in the missing arm or hand. Pain was scored using a 0–10 scale where 0 is no pain and 10 the worst pain imaginable.

3. Results

Forty upper limb amputees were interviewed, 11 of whom were bilateral, resulting in a total of 51 amputations (Table 1). There were 32 males and eight females in the study group. All of the bilateral and most of the unilateral amputees were males. No one religion or tribe appears to have been targeted. The average age was 39.4 years (range 16–68). Forty nine (96%) of the amputations were below elbow, and 2 (4%) above elbow.

The method of injury was by machete (locally called a cutlass) in 35 (69%), axe in 12 (23%) and gunshot in four (8%) of the amputations. Typically victims were told at gun point to lie on the ground and put their arm out, sometimes onto a piece of wood or tree root when a blow or blows from the axe or machete were delivered. In the bilateral amputees the injury was caused by axe in four and by machete in seven and it was by the same method in both limbs. In the unilateral amputees the majority (21) were caused by machete and four each by axe and gunshot.

The number of primary amputations, those complete at the time of injury, was 28 (56%). Twenty-two (44%) of the limbs were amputated subsequently at hospital (secondary). For one amputation, this was unknown. All patients had at least one operation to create or debride the stump(s). The average time between the injury and the first hospital operation was 10 days (248 h). The delay in treatment was partly because of security problems, but the country is poorly supplied with both health services and transport, which were disrupted during the conflict.

3.1. Stump pain

All amputees (40/40) reported stump pain in the last month, which was mostly intermittent (Table 2). Stump pain was present in 50/51 (98%) of the amputations. Of the eleven bilateral amputees, ten had bilateral stump pain and one had unilateral stump pain. All unilateral amputees had stump pain. The mean worst pain score for stump pain in bilateral amputees was 3 (range 0–8) and in unilateral amputees 4.5 (range 1–9). There was no sex difference for the incidence or severity of stump pain.

3.2. Phantom sensation

Phantom sensation at any time since amputation was also common with 37/40 (92.5%) of amputees and 47/51 (92%) of amputations effected (Table 3). Phantom sensation was equally common in males (29/32) and females (8/8). Of the two unilateral amputees with no phantom sensation one also had no phantom from his amputated ear. The other stated he only experienced phantom sensation in dreams and so was scored as negative. The single bilateral amputee who stated he had no phantom sensation in either limb also stated that he often tried to use the hands and could not, for example to scratch something, felt discouraged, and could not believe it since he was born with hands. This description has many features of phantom sensation. The ten other bilateral amputees had bilateral phantom sensation.

Of the 43 responses concerning the shape of the phantom,

Table 2
Stump pain

	Bilateral	Unilateral
Prevalence		
Amputees	11/11 (100%)	29/29 (100%)
Amputations	21/22 (95%)	N.A.
Frequency		
Continuous	5 (22%)	4 (14%)
Intermittent	16 (76%)	25 (86%)
Unknown	1 (2%)	0
Total	22 (100%)	29 (100%)

Table 3
Phantom sensation

	Bilateral	Unilateral
Prevalence		
Amputees	10/11 (91%)	27/29 (93%)
Amputations	20/22 (91%)	N/A
Shape of phantom (amputations)		
Normal	14 (64%)	11 (38%)
Telescoped	2 (9%)	8 (28%)
Cannot say	2 (9%)	6 (21%)
Not recorded	4 (18%)	4 (14%)
Total	22 (100%)	29 (100%)

25 were of a normal shape, ten telescoped (defined as the hand or fingers moving proximally from their original position) and in eight, it was uncertain. Telescoping was present in both unilateral and bilateral amputees, and the single bilateral amputee with telescoping had this on both sides. Although telescoping was more common in males (8/32) than females (1/8), this was not significant (Fisher's exact $P = 0.41$).

3.3. Phantom pain

Phantom pain was present in 13/40 (32.5%) of amputees 15/51 (29%) of the amputations (Table 4). The pain was always located in the hand and in one case also in the missing forearm. In all patients the phantom pain was intermittent, usually 1–2 h each day for most days of the week. Phantom pain was present in 11/29 (38%) of the unilateral and 2/11 (18%) of the bilateral amputees. The phantom pain in the two bilateral amputees was present in both limbs, and was absent bilaterally in the other nine. Phantom pain was more common in women 5/8 (63%) than men 8/32 (25%) and this was not significant (Fisher's exact $P = 0.057$). In the whole group of 40 amputees, the presence of phantom pain was not associated with religion, primary or secondary amputation, presence of telescoping or how the injury was performed (axe, machete or gunshot).

Those amputees who developed phantom pain had a larger number of hours (in pain) between the incident and their first operation (median 240 h) than those who did not develop phantom pain (median 96 h), although this was not statistically significant.

The hand dominance of the 29 unilateral amputees was investigated as a possible influence upon the development of phantom pain. Although dominant limb amputation was more likely to result in phantom pain, this was not significant (Fisher's exact $P = 0.262$).

Table 4
Phantom pain

	Bilateral	Unilateral
Prevalence		
Amputees	2/11 (18%)	11/29 (38%)
Amputations	4/22 (18%)	N.A.
Frequency		
Continuous	0	0
Intermittent	4 (100%)	11 (100%)
Worst pain score 0–10 (range)	2 (2–2) $n = 4$	4.3 (2–6) $n = 9$
Days/week	7 (7–7) $n = 2$	3.8 (1–7) $n = 10$
Hours/day	1 (1–1) $n = 2$	1.6 (0.5–3) $n = 6$

3.4. Mood

Amputees were asked to rate their mood over the last month using the scale 'very happy, happy, normal, sad, very sad'. No amputee chose very happy or very sad (Table 5). Of the 13 amputees with phantom pain, eight (62%) were sad, whereas of the 26 amputees without phantom pain nine (35%) were sad, which was not significant (chi-squared 2.55, $P = 0.111$) There was no correlation between gender and sadness.

3.5. Neuromas

Many amputees had tender areas in their stumps and deciding when to call a tender area a neuroma was subjective. In order to qualify as a neuroma, the tender area had to be discreet and extremely sensitive. By these criteria 12/51 (24%) of amputations and 12/40 (30%) of amputees had neuromas. Ten were in unilateral amputees (10/29, 35%) and two were in different bilateral amputees (2/11, 18%). The presence of neuromas was not related to gender, religion, ethnic origin, time to operation or whether it was a primary or secondary amputation. Although the numbers were small, significantly more neuromas occurred after gunshot injuries (3/4, 75%), than after axe (4/12, 33%) or machete (5/35, 14%) injuries (chi-squared 8.19, $P = 0.017$). There was also a significant association between neuromas and telescoping. Of the 25 phantoms of normal shape, four (16%) had neuromas, whereas of the ten telescoped phantoms seven (70%) had neuromas (chi-squared 9.66, $P = 0.002$). There was no correlation between amputations with neuromas and those with phantom pain. Phantom pain was present in 3/12 (25%) of amputations with neuromas and 12/39 (31%) of amputations without neuromas.

4. Discussion

Limb amputation, as a result of disease or injury, is a

Table 5
Mood

Mood	Bilateral	Unilateral
Happy	1/11 (9%)	5/29 (17%)
Normal	4/11 (36%)	12/29 (41%)
Sad	6/11 (55%)	11/29 (40%)
Unknown	0	1/29 (3%)

common operation worldwide (Muyembe and Muhinga, 1999; Gujral et al., 1993). Pain after limb amputation is common (Jensen et al., 1985) and hard to treat (Sherman et al., 1980). Pain after amputation is therefore an important health issue worldwide.

This study investigated a unique cohort of amputees in a unique setting. All subjects had previously healthy limbs, and the injuries were sustained as a result of a campaign of terror. The amputees were a relatively homogenous group, with respect to the circumstances of the amputation, uninfluenced by medical treatment, but considerably influenced by poverty and displacement in a country torn by civil war (de Jong et al., 2000). The circumstances are similar to those described where landmines have resulted in upper and lower limb amputations (de Smet et al., 1998; Joss, 1997).

As a result of the setting, it was difficult to achieve the same standards as in developed countries. Despite these shortcomings, the results are important because this group of patients differs from those studied previously in several respects. Three factors are of particular interest. First, the subjects all had healthy limbs prior to injury, secondly 11 of the 40 subjects sustained bilateral upper limb amputation, and thirdly some of these patients had a complete amputation at the time of the injury, but others had a severe injury initially which was later converted to an amputation in hospital.

The incidence of phantom pain (29% of amputations) is lower than expected and the incidence of stump pain (98% of amputations) higher than expected, in comparison to previous studies (Kooijman et al., 2000; Montoya et al., 1997). The high incidence of phantom sensation (92%), is broadly in line with previous studies. It is possible that communication problems made it hard to distinguish between phantom pain and phantom sensations. The two phenomena may form a continuum rather than being distinct entities (Kooijman et al., 2000), and patients may have difficulty distinguishing between the two (Hill, 1999). It is interesting to note that all these patients were anaesthetised using ketamine (personal communication Dr E. Vreede, MSF), which has been advocated for the treatment of neuropathic pain. It is not possible to say whether this had any influence on the outcome. It is possible that the high incidence of stump pain may be related to the general poor quality of medical treatment available.

Data from the bilateral amputees is interesting because some phenomena show concordance between the two sides, while others do not. Phantom pain, phantom sensation and telescoping all showed concordance, while stump pain and neuromas did not show concordance. Unfortunately the numbers are small so it is not possible to draw firm conclusions, but it raises an interesting question for further study.

Several papers have suggested that pain prior to amputation is a risk factor for the development of phantom pain (Jensen et al., 1985; Houghton et al., 1994), although this remains controversial, and patient's memory for preamputation pain may not be reliable (Nikolajsen et al., 1997). In this study, 56% of the subjects lost their limb at the time of the initial injury (primary amputation), but 44% had an initial injury and an amputation subsequently (secondary amputation). It is reasonable to assume that the secondary amputation group suffered pain, possibly severe, between the two events. There was no correlation between the development of stump or phantom pain and whether the amputation was primary or secondary. There was also no correlation between the incidence of phantom pain and the time between the initial injury and the secondary amputation. There were two bilateral amputees who had a primary amputation on one side and a secondary amputation on the other, thereby acting as their own controls. Neither suffered phantom pain. Both had stump pain and one had similar pain scores on both sides, the other had more pain on the side of the secondary amputation. Once again it is hard to draw definite conclusions from these findings as the numbers are small, and the exact nature of the initial injury was impossible to ascertain.

This study was intended as a preliminary investigation and further studies are continuing to investigate some of the interesting questions that arise from it. The study has drawn attention to the extent of pain as a problem in this population. As a result MSF has added the treatment of chronic pain to the existing clinic in the Murray Town Camp, in an attempt to try and help these unfortunate individuals.

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