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Skin Disorders Associated with Bilateral Lower Extremity Amputation

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Abstract: We conducted this study to determine the types and frequency of skin problems among war related bilateral lower limb amputees. Three hundred and thirty five cases were examined for dermatologic problems in about 20 years (20±3.89) after bilateral lower extremity amputation. The subjects were injured during the Iraq-Iran war. Descriptive statistics were used. At least one skin problem was found in 189 (56.4%) of the amputees. Three hundred and nineteen skin problems were diagnosed in 189 amputees. The most common skin problems were contact dermatitis 39.5% (n = 126), calluses 26.6% (n = 85), folliculitis 14.42% (n = 46) and ulcers 7.2% (n = 23). The skin problems were more frequently seen in subjects with bilateral below the knee amputation. Skin problems were highly incident in our amputees. The substantial multidisciplinary rehabilitation team included a dermatologist, orthopedic surgeon, prosthetist and physical therapist is recommended to prevent and diagnose these problems on time.

Key words: Skin, amputees, war, lower limb, rehabilitation

INTRODUCTION

As a consequence of the eight years Iran-Iraq, war more than 400,000 individuals developed variety of physical disabilities (Zargar *et al*., 2007). Of the 11570 suffer from lower limb amputation due to the war (Shojaei *et al*., 2009), at least 578 are bilateral lower limb amputees (Mousavi *et al*., 2009). They are young healthy persons that lost their limbs in the high efficient age. Hence, the importance of ambulation quality for these active young amputees can not be overemphasized (Mousavi *et al*., 2009).

The normal use of a prosthesis requires healthy skin on the residual limb. It is widely accepted that the residual limb skin problems are common in lower limb amputees who uses prosthesis. Most are caused by mechanical force may result in skin destruction and proliferation, by occlusion may results in humidity and bacterial or fungal infection, by maladaptation of prosthesis or socket, by hypersensitivity to the material of the prosthesis and by poor hygiene (Levy, 1992; Huston *et al*., 1998). Early diagnosis and treatment of these problems can provide a higher level of ambulation and well-being for amputees (Levy, 1992; Mousavi *et al*., 2009).

Though the variety of skin lesions have been reported in amputees but the prevalence of stump skin problems that amputees experience are basically unknown (Meulenbelt *et al*., 2006, 2007).

To our knowledge, this is the first report that investigates the types and frequency of skin problems in war related bilateral lower limbs amputees.

MATERIALS AND METHODS

Iranian Veterans and Martyrs Affairs Foundation (VMAF) serve all the Iran-Iraq war survivors. About 578 of the survivors are bilateral lower limbs amputees (Mousavi *et al*., 2009). All the above survivors from 20 provinces were invited to participate in health assessment project, which took place in Shiraz (one of the provinces of Iran). All participants visited separately by the research team included; internal medicine, dermatologist, orthopedic surgeon, physiatrist and prosthetist. The project was performed during 2006-2007.

A structured questionnaire was used for data collection consisted of the following domains: demographics, injury details, characteristics of the amputation, stump, prostheses, gait aid, stump hygiene status and any possible skin lesions.

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The members of the research team took interviews, physical examination, review of wartime medical records, update medical history of the patients and fulfilled the questionnaire as well. All participants were examined for skin problems by a dermatologist. Photographs documented all skin lesions for more investigation and follow up. Frequency and types of skin problems and various parameters such as demographics, injury details and amputation characteristics were determined as descriptive statistics. Analysis was done by SPSS, version 11.5.

RESULTS

Responses were received from 335 of the 578 patients (response rate, 58%) who were invited.

Of our 335 bilateral lower limb amputees, 327 (97.6%) were male and 8(2.4%) were female. The average age of the amputees was 42.6±6.32 years. The average age at the time of injury was 22.6±4.3 years and the average time since amputation was 20%±3.89 years. 327 (97.6%) were married and 86 (25.7%) were employed. The most common cause of amputation was the blast injury from grenades (n = 191, 56%). The other main causes were land mine explosion (n = 111, 33%) and bombing (n = 16, 4.7%). More than two-third of our amputees, 270 (80.5%) were using a prosthesis, 10 (3%) never used prosthesis after their injury and 55 (16.4%) had to stop prosthesis usage.

The most common level of amputation was bilateral below- knee 162 (48.4%) followed by one below one above 98 (26.3%) and bilateral above-knee amputation, 75 (22.4%).

In total 319 skin problems with 16 different types were detected in 189 (56.4%) of 335 amputees. some patient had more than one skin problem (Table 1).

The most common skin problems in order of frequency were contact dermatitis (Fig. 1-3), callus (Fig. 4, 5), folliculitis (Fig. 6) and ulcers (Fig. 7) (Table 2).

Fig. 1: Contacts dermatitis on the distal stump skin

Skin problems were more common in bilateral below-knee amputees, 94 (49.7%) than any other

Table 1: Number of skin problem in every amputee

No. of skin problem	Amputees
None	146 (43.6)
One	90 (26.86)
Two	72 (21.5)
Three	23 (6.84)
Four+	4 (1.2)
total	335 (100)

Values in brackets are percentage

Table 2: Frequency and type of skin problems

Type	Number
Dermatitis	126 (39.5)
Callus	85 (26.6)
Folliculitis	46 (14.42)
Ulcer	23 (7.2)
Furuncles	10 (3.13)
Wart	6 (1.9)
Neuroma	6 (1.9)
Stump edema	5 (1.6)
Epidermal cyst	3 (0.94)
Others	9 (2.82)
Total	319 (100)

Values in brackets are percentage

Fig. 2: Contacts dermatitis in patient with above-knee prosthesis

Fig. 3: Contacts dermatitis in below-knee amputee

Fig. 4: Callus formation with super-added bacterial infection on the stump of lower limb amputees

Fig. 5: Callus formation on the amputation stump area

Fig. 6: Folliculities in patient with below-knee amputation

levels. The skin problems by the level of amputation are described in Table 3.

Only one third of patients (51/189) who confirmed their dermatologic problems in this study had sought medical advice (Table 4).

Fifty five patients had stopped using prosthesis, 12 out of 55, due to skin problems.

Fig. 7: Ulcer formation in prosthesis contact area

Table 3: Level of amputation and number of skin problems

Level	Number	Skin problem No.
Both below knee	162 (48.4)	94 (49.7)
One below one above	98 (29.3)	61 (32.3)
Both above knee	75 (22.4)	34 (18)
Total	335 (100)	189 (100)

Values in brackets are percentage

Table 4: Frequency of skin problems

	Previously had sought medical advice	Skin problem diagnosed in the study
Yes	51 (27)	189 (56.4)
No	284 (73)	146 (43.6)
Total	335 (100)	335 (100)

Values in brackets are percentage

DISCUSSION

The majority of war related bilateral lower limb amputees were examined for dermatologic complaints during the study period.

Prevalence rate: The prevalence rate of skin problems in our study was 56.4% (n = 189): Dudek *et al*. (2005) in a retrospective chart review study, reported a prevalence rate of skin problems 40.7%. DesGroseilliers *et al*. (1978) and Lyon *et al*. (2000) in their descriptive clinical studies reported a prevalence rate of 34%. Meulenbelt *et al*. (2007) in self-reported questionnaire survey and Koc *et al*. (2008) in a descriptive clinical study found 63 and 73.9% of skin problems respectively. All above studies reported a high prevalence of dermatologic problems in lower limb amputees. It seems different prevalence rate of skin problems are because of different underlying conditions and study design, such as study population and skin problems definition.

Common skin problems: The most common skin problems in our study was contact dermatitis, followed by callus, folliculitis, ulcers and furuncles. The most common skin problems detected in the study of terrorism related amputees by Koc *et al*. (2008) were dermatitis, bacterial infection, callus, fungal infection and erosion.

Lake and Supon (1997) reported problems with contact dermatitis, folliculitis, heat rash and residual limb soreness in their cases. These problems were more common in traumatic amputees than vascular amputees. In Dudek *et al*. (2005) ulcer, irritation, inclusion cyst, callus and verrucous hyperplasia were most common skin problems respectively. Inclusion cyst and callus were more prevalent in traumatic amputees. Lyon *et al*. (2000) reported allergic dermatitis as a significant skin problem in their study population.

These studies finding demonstrate that amputees could experience different types of dermatologic problems based on the underlying cause of amputation. Contact dermatitis, callus and bacterial infection have been reported more frequently in traumatic amputees. These results recommend investigation about the relationship between the amputation characteristics and the types of skin problems, suggested by Dudek *et al*. (2005) study.

Amputation level: We also found bilateral below-knee amputees were more affected by dermatologic problems. this might be explained by concentration of weight bearing forces on bony prominence and higher level of activity in below-knee amputees. This finding is similar with previous study (Dudek *et al*., 2005; Lake and Supon, 1997).

Skin problem awareness: An unexpected finding in our study was lack of awareness about the significance of the skin problems and seeking medical advice in patients (51/189). Since skin problems restricted using of prosthetics limb in some patients (12 out of 55), educational programs for healthcare provider and patients recommended to prevent any problems that may return the amputees to crutches or bed rest.

Lower limb amputees are frequently involved with skin problems, which affect their quality of life and well-being because of restricting their ambulation by prosthetics limb. Therefore, amputees and their rehabilitation team must be aware of certain skin problems that the amputees might experience to deal with it as early as possible.

Future research should be focused on contributing factors that may put the amputees at risk for developing skin problems.

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