High Prevalence of Stump Dermatoses 38 Years or More After Amputation

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Objective: To highlight the prevalence and impact of skin disease at the stump site in patients who have undergone amputation.

Design: A cross-sectional health questionnaire of Vietnam War veterans with stump dermatoses at least 38 years after major limb amputation.

Setting: A research registry of veterans with combat-related amputations who agreed to participate.


Main Outcome Measures: Results of a self-reported 35-item questionnaire. Participants were later contacted by telephone or asked to complete a Web survey.

Results: Of the 247 veterans, 119 (48.2%) reported at least 1 skin problem within the preceding year. The most common were skin breakdown (25.2%), rash (21.8%), and abrasion (21.0%). In addition, 25.2% experienced skin problems more than 50% of the time, and 37.1% had to alter or replace their prosthesis. Stump dermatoses limited or prevented prosthesis use in the preceding year for 55.6% and caused pain or discomfort at the stump site in 61.5%.

Conclusions: More than 38 years after major limb amputation, skin complications at the stump site continue to cause significant morbidities and contribute to prosthesis abandonment. The high prevalence of stump dermatoses stresses the importance of disease prevention, early management, and advanced treatment of skin disease.


TWO MILLION PATIENTS WHO have undergone amputation reside in the United States alone, with more than 130,000 new amputations occurring each year.1,2 Despite the high number of individuals living with amputations (hereinafter referred to as amputees), the skin conditions they experience are underappreciated. For this reason, specific skin questions were included in the Indiana-Ohio Center for Traumatic Amputation Rehabilitation Research health survey of Vietnam War veterans to assess skin disease at the stump site at least 38 years after major limb amputations.

Amputations are performed owing to disease (eg, diabetes mellitus, peripheral vascular disease, and cancer), traumatic injury (eg, combat and motor vehicle accidents), congenital limb deformities, and anomalies of residual limbs.13 During the past 10 years, the wars in Iraq and Afghanistan have resulted in a significant number of veterans living with amputations, demonstrating that amputees are often one of the most visible symbols of war. According to US Military Casualty Statistics through April 2010, 987 Operation Iraqi Freedom/Operation Enduring Freedom (OIF/OEF) veteran amputees had undergone a total of 1230 limb amputations. Of these, 233 veterans (23.6%) underwent multiple limb amputations, 10 had 3-limb involvement, and 2 had all 4 limbs amputated.8 In comparison, current estimates place the number of Vietnam War veterans living with amputations at 2500.7

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Amputations present daunting psychological, social, functional, and financial challenges to patients and their communities. In addition to these challenges, prosthesis use is often complicated by recurring stump site dermatoses with a prevalence rate ranging from 34% to 74%.
Skin dermatoses at the stump site represent a broad spectrum of clinical skin disease that is often challenging to treat. Given the high incidence of skin dermatoses at the stump, the Indiana-Ohio Center for Traumatic Amputation Rehabilitation Research included specific questions in their amputee health assessment questionnaire to address skin conditions in their Vietnam War veteran cohort. We herein discuss these findings in the context of published literature regarding stump dermatoses.

Table 1. Prevalence of Skin Dermatoses at Stump Site in Amputees

<table>
<thead>
<tr>
<th>Source</th>
<th>Type of Study</th>
<th>Dermatoses Prevalence, %</th>
<th>Location of Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lyon et al, 2000</td>
<td>Questionnaire</td>
<td>34</td>
<td>United Kingdom</td>
</tr>
<tr>
<td>Dudek et al, 2005</td>
<td>Retrospective medical record review</td>
<td>41</td>
<td>Canada</td>
</tr>
<tr>
<td>Meulenbelt et al, 2007</td>
<td>Literature review</td>
<td>63</td>
<td>The Netherlands</td>
</tr>
<tr>
<td>Koc et al, 2008</td>
<td>Questionnaire and retrospective medical record review</td>
<td>74</td>
<td>Turkey</td>
</tr>
<tr>
<td>Dismounted Complex Blast Injury Task Force, 2011</td>
<td>Questionnaire</td>
<td>58</td>
<td>United States</td>
</tr>
</tbody>
</table>

Table 1 shows that nearly half of the 247 Vietnam War veteran respondents who participated in the survey (n = 119 [48.2%]) reported experiencing skin breakdown or rash in the preceding year. A quarter of these veterans experienced such problems more than 50% of the time (n = 30 [25.2%]) or all of the time (n = 7 [5.9%]) in the preceding year. When asked to describe the nature of the problems, the veterans described a wide array of skin complications. For example, they described staphylococcus infection and sores, recurrent cyst, blisters at the end of the stump, broken skin, an abrasion, skin infection requiring a stump revision, sore spots and small boils, constant discoloration, crusty wartlike areas, skin rash, breaking open of the closure scar, calluses that break off and bleed, skin irritation, raw skin that causes pain, hemorrhagic blister, rawness, boil type bumps, bone against skin sore, and pressure sores. Among these complications, the most common were skin breakdown, scars, and wounds (n = 30 [25.2%]); rash (n = 26 [21.8%]); and abrasion or “rubbing off” of the skin (n = 25 [21.0%]).

Of the 416 men in the Indiana-Ohio Center for Traumatic Amputation Rehabilitation Research Vietnam War veteran registry, 247 completed the survey for a 59.3% response rate. Results of χ² analysis showed no statistically different differences between the responders and nonresponders on a variety of health, amputation level, and demographic characteristics. The average (SD) age of the 247 Vietnam War veterans was 62 (3) years. The average (SD) time since war-related amputation was 38 (3) years. All of the subjects were men and nearly all (n = 227 [91.9%]) were white. The most common level of amputation was the unilateral lower limb (n = 153 [61.9%]) and bilateral lower extremity loss (n = 54 [21.9%]).
of the skin problems in the open-ended question of the 244 survey respondents who provided an explanation (n = 46 [68.7%]) attributed the cause of their skin problems to use of their prosthesis. A small percentage of veterans attributed their skin problems to problems associated with heat (n = 12 [17.9%]), stump/bone complications (n = 5 [7.5%]), and complications from their initial or subsequent limb loss related surgeries (n = 4 [6.0%]).

Of those reporting skin problems, more than half (n = 64 [55.6%]) reported that skin problems at their stump site limited or prevented use of their prosthesis for an average of 28 days in the preceding year. Nearly half of those veterans (n = 43 [37.1%]) also had to alter or replace their prosthesis because of skin problems during that time. Finally, 150 of 244 respondents (61.5%) reported pain and discomfort at the stump site due to a skin problem, thus affecting their quality of life for more than 2 months (average, 79 days) during the preceding year.

**COMMENT**

During the last decade, multiple studies have reported a high prevalence rate of stump dermatoses ranging from 34% to 74% and a rate of 48% in the most recent Vietnam War veteran study.4,5,8-10 The prevalence rate of stump dermatoses that we report in Vietnam War veterans (48.2%) is consistent with that found in the published literature. However, our study is unique because the veterans underwent assessment at least 38 years after major limb amputation. Our results show definitively that stump dermatoses are a long-term problem in amputees.

The spread of the prevalence rate data from the different studies may be explained by the different study methods, variables, and data sources. For example, the higher prevalence rate (74%) found by Koc et al3 may be due to the more inclusive nature of a descriptive study, which incorporates even minor types of dermatoses. A higher percentage of the Vietnam War veterans in our study reported pain due to a skin problem (61.5%) compared with specific skin breakdown or rash (48.2%), which demonstrates how more general sampling and questions can lead to increased reporting. The use of clinical notes by Dudek et al4 may have contributed to the lower reported prevalence rate of dermatoses (41%), because this form of data collection relies on reporting by a physician or caregiver, and skin diseases may not have been recorded in the clinical note. Despite these variations between studies, even with the modern advancements in prosthesis and medical technology, stump dermatoses still affect about half of amputees.

A possible contributing factor in the continuing high incidence of stump dermatoses may be the more aggressive and regular use of the prosthesis by the amputees as a result of improved prosthesis technology. Nearly all of the 67 survey respondents who provided an explanation of their skin problems in the open-ended question attributed these problems to the use of the prosthesis.

Unfortunately, current medical technology has not resolved the challenges of customization, fit, and comfort of the prosthesis for the amputee as noted in the report from the US Army Dismounted Complex Blast Injury Task Force.9 These challenges resulted in OIF/OEF veteran amputees’ reporting high rates of dissatisfaction and even abandonment of their prosthesis. More than half of OIF/OEF veteran amputees have reported stump skin complications. Unfortunately, many of these recent veterans from the wars in Iraq and Afghanistan will continue to experience stump dermatoses, given that as many as 48% of the Vietnam War veteran population in this study have skin disease at the stump site at least 38 years after major limb amputation.

The finding in this study that Vietnam War veteran amputees continue to struggle with the frequent recurrence of stump dermatoses demonstrates that there is limited natural adaptation of the stump skin to the prosthesis over time. Stump dermatoses will be a lifelong health problem and financial burden for an amputee if more permanent interventions are not found.

Current clinical studies indicate that frictional and mechanical trauma to the stump skin by the prosthesis is believed to cause most of the stump dermatoses.4,10 The treatments for many dermatoses such as the use of antibiotics for superinfection, emollients and topical corticosteroids for contact dermatitis, and even surgery for epidermal inclusion cysts merely alleviate these dermatoses. No therapy addresses the root cause of the inability of stump skin to withstand the mechanical and frictional forces generated by the prosthesis and the socket-limb interaction. More research is needed to develop interventions to prevent stump dermatoses from occurring altogether. Such interventions are critically needed to greatly reduce the psychological, social, and physical trauma to the stump skin by the prosthesis.
functional challenges, and financial costs associated with the maintenance and treatment of stump dermatoses and improve the quality of life for all amputees who use a prosthetic device.

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Author Contribution: Drs Foote and Meyerle had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Yang, Garza, and Meyerle. Analysis and interpretation of data: Yang, Foote, Kang, and Meyerle. Drafting of the manuscript: Yang, Foote, and Meyerle. Critical revision of the manuscript for important intellectual content: Yang, Garza, Kang, and Meyerle. Statistical analysis: Yang, Foote, and Meyerle. Administrative, technical, and material support: Yang, Garza, Kang, and Meyerle. Study supervision: Kang and Meyerle.
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REFERENCES