

## Aquatic sports dermatoses: Part 3 On the water

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### Introduction

Water related sports dermatoses constitute a group of diverse conditions unique to athletes who train and compete in aquatic environments. In the first two parts of this series, we reviewed the cutaneous manifestations of freshwater- and saltwater-related dermatoses in subjects who spend the majority of their time in the water, as opposed to those who are separated from the water by a physical vessel or barrier. Herein, we complete this review with a discussion of the clinical presentations and treatments of common and rare dermatologic conditions seen in athletes who partake in sports near or on the water, including sailing, rowing, fishing, surfing, windsurfing, whitewater rafting, and water-skiing. A summary of these conditions may be found in Table 1.

### Sailing and Rowing

#### Pulling boat hands

##### *Background*

Pulling boat hands, most frequently seen in crew team members and open rowing or sailing craft athletes, occur as a result of a combination of mechanical injury and

### Abstract

The third of this three-part series on water-related sports dermatoses discusses skin changes seen in athletes who participate in sporting activities on top of or nearby water. While also susceptible to several of the freshwater and saltwater dermatoses discussed in parts one and two of the series, these athletes may present with skin changes unique to their particular sports. This updated and comprehensive review details those near-water dermatologic conditions commonly seen in sailors, rowers, fishermen, surfers, windsurfers, rafters, and water skiers, and will serve as a guide for dermatologists, sports medicine physicians and other medical practitioners in recognition and treatment of these conditions.

exposure to cold.<sup>1</sup> A total of 62% of subjects affected by pulling boat hands demonstrate Raynaud's phenomenon (Fig. 1), which causes the distal digits to become numb and exhibit a well-demarcated pallor, and then to undergo color changes from white to blue to red. Raynaud's phenomenon can be distinguished from pulling boat hands by the lack of epidermal changes in the former condition.<sup>1</sup>

##### *Clinical presentation*

Affected subjects present with painful, pruritic and erythematous papules, macules, nodules and blisters. Typically, these lesions occur over the distal dorsal aspects of the hands and proximal phalanges and spare the skin overlying the metacarpophalangeal (MCP) joints and fingertips.

##### *Treatment*

Topical corticosteroids, moisturizers, gloves and freshwater soaks help assuage rowers' symptoms.

### Sailor's marks

##### *Background*

Sailor's marks represent hyperkeratotic thickenings of the stratum corneum, or calluses, caused by external

**Table 1** Summary of aquatic sports dermatoses occurring in sports on or near the water

Dermatosis	Clinical appearance
Sailing and rowing dermatoses	
Pulling boat hands	Painful, pruritic, erythematous papules and macules on dorsal hands/proximal fingers
Sailor's marks	Band-shaped calluses on bilateral first and fifth metacarpophalangeal joints
Rowing blisters	Painful vesicles and bullae on the anterior phalanges and palms
Sculler's knuckles	Abrasions on the dorsal proximal interphalangeal or metacarpophalangeal joints of the first and second digits
Slide bites	Abrasions on the posterior lower legs
Rower's rump	Well-demarcated, lichenified plaques on the superior buttocks
Acne mechanica	Papules, pustules, nodules and discharging sinuses on the buttocks (or face, chest and back in various other sports)
Fishing dermatoses	
Fishing rod dermatitis	Unilateral, red, scaling hand plaques
Dogger bank itch	Similar to swimmer's itch
Live fish bait allergy	Pruritic dermatitis of seawater-exposed areas, such as the hands, forearms and face
	Pruritus and edema of bilateral hands with possible hyperkeratotic changes of bilateral volar thumbs and index fingers
Erysipeloid	Well-circumscribed, tender, violaceous, edematous plaques on fingers and hands
Rubber boot dermatitis	Eczematous eruption on legs and feet
Chilblains	Small, erythematous or violaceous macules and papules on areas exposed to cold, with possible swelling, tenderness and pruritus
Cutaneous mucormycosis	Presentation is notoriously variable May present with indolent, nonhealing ulcers or rapidly growing, necrotizing lesions
Surfing dermatoses	
Surfer's nodules	See Table 2
Surf rider's dermatitis	Painful erythema/edema of chest/nipples
Windsurfing dermatoses	
Wishbone/windsurfer's dermatitis	Erythematous, pruritic plaques on palms
Reactive forearm hyperemia	Diffuse, patchy erythema on forearms
Whitewater rafting dermatoses	
Staphylococcal furunculosis	Tender, well-defined, erythematous, occasionally fluctuant nodules
Water-skiing dermatoses	
Rope burns	Abrasions and contusions often arranged diagonally across superior aspects of the anterior and medial thighs
<i>Aeromonas hydrophila</i> infection	Occasional folliculitis Often rapid onset of cellulitis or abscess

factors, such as friction.<sup>2</sup> In sailors, lesions develop over locations at which ropes rub against the skin of the hands.

#### *Clinical presentation*

These band-shaped calluses occur bilaterally on the dorsolateral and palmar regions of the first MCP joint and the mediopalmar site of the fifth MCP joint.

#### *Treatment*

Wearing protective gloves while sailing prevents sailor's marks.

#### **Rowing blisters**

##### *Background*

Rowing blisters occur as a result of friction with oar handles.<sup>3</sup>

#### *Clinical presentation*

Painful blisters typically occur on the anterior surfaces of the fingers and palm.

#### *Treatment*

Athletes should use smoothed wooden sweep handles. If blisters have already occurred, the subject should drain them without disturbing the roof up to three times in the first 24 h; the athlete should then apply petroleum jelly and cover with an occlusive dressing.

#### **Sculler's knuckles**

##### *Background*

During the "crossover" stroke, a sculler crosses the left hand over the right while maintaining the handles at a similar height. Rowers whose right knuckles chronically rub on the left hand or the handle may develop sculler's knuckles.<sup>3</sup>



**Figure 1** Raynaud's phenomenon (shown here) can be differentiated from pulling boat hands by the absence of epidermal changes. (Photograph courtesy of NYU Department of Dermatology)

*Clinical presentation*

Athletes present with abrasions on the dorsum of the right hand. Specifically, lesions occur at either the proximal interphalangeal joint (PIP joint) or the MCP joint of the first and second digits.<sup>3</sup>

*Treatment*

Lesions heal spontaneously within weeks.

**Slide bites**

*Background*

Occasionally, when a rower pushes his or her legs through the drive phase, the sliding seat's tracks come into contact with the skin overlying the calf muscles and result in the formation of slide bites.<sup>3</sup>

*Clinical presentation*

Athletes present with abrasions on the posterior lower legs.<sup>3</sup>

*Treatment*

Abrasions heal spontaneously within weeks. In order to prevent future injuries, subjects can wear cut-off socks or tape to protect their posterior lower legs.

**Rower's rump**

*Background*

Rower's rump refers to lichen simplex chronicus-like lesions on the buttocks that occur as a result of improperly fitted rowing seats.<sup>4</sup>

*Clinical presentation*

Lesions present as well-demarcated, lichenified plaques on the superior buttocks.<sup>4</sup>

*Treatment*

Topical corticosteroids relieve pruritus. A cushion prevents the development of lesions.

**Acne mechanica**

*Background*

Long sailing trips may precipitate the development of acne mechanica of the buttocks as a result of the mechanical friction, sweating, saturated clothing and sitting on a hard bench for an extended period.<sup>5</sup> This saturation increases keratin hydration and reduces the orifice size of pilosebaceous units, which obstructs sebum flow.<sup>6</sup>

*Clinical presentation*

Patients may develop papules, pustules and extremely tender nodules with discharging sinuses on the buttocks.

*Treatment*

Patients may require therapy with combinations of prednisolone, minocycline, isotretinoin or dapsone.<sup>5</sup>

**Fishing**

**Fishing rod dermatitis**

*Background*

Fishing rod dermatitis occurs as a result of exposure to *N*-isopropyl-*N'*-phenyl-*p*-phenylenediamine (IPPD) or a closely related component of carbon-fiber fishing rods.<sup>7</sup>

*Clinical presentation*

Patients present with unilateral, red, scaly hand plaques (Fig. 2).



**Figure 2** Patients with fishing rod dermatitis typically present with a unilateral erythematous scaly hand. Note the collarettes of scale indicating an eczematous process

#### Treatment

Affected fishermen should use topical corticosteroids and oral antihistamines. Athletes should fish with IPPD-free rods or cover the handle with insulating tape.

#### Dogger bank itch

##### Background

Dogger bank itch, also known as “dead man’s fingers”, “sea chervil”, “curly weed”, “amber weed” and “ju-ju weed”, presents as an allergic contact dermatitis to (2-hydroxy-ethyl) dimethylsulphoxonium, a metabolite of the marine bryozoan, *Alcyonidium diaphanum*.<sup>8</sup> This organism forms seaweed-like rubbery colonies, most commonly along the coast of the North Sea, in such locations as Ireland, the UK, especially Scotland, and nearby mainland Europe, especially Denmark.<sup>8,9</sup> Sensitized individuals often experience a seasonally recurrent eczematous eruption that usually occurs between the months of June and August when *A. diaphanum* grows most abundantly. Additionally, a photosensitive eczematous dermatitis also occurs in fishermen in the English Channel; this eruption has similarly been associated with contact with the bryozoan, *Alcyonidium gelatinosum*.<sup>10</sup> As with dogger bank itch, an epidemiologic study published in 2009 confirmed that stings or contacts with marine animals represent the most frequent skin ailment among sea fishermen.<sup>11</sup>

##### Clinical presentation

Similar to swimmer’s itch, this pruritic dermatitis involves seawater-exposed areas such as the hands, forearms and face.<sup>12</sup> Blistering, periorbital edema and swelling of the arms and legs may occur.<sup>13,14</sup>

##### Treatment

Appropriate therapy includes topical corticosteroids, oral corticosteroids or cyclosporine.<sup>15</sup>

#### Live fish bait allergy

##### Background

Insect and worm larvae used as fish bait represent common sources of allergy in both anglers and workers; such allergy may cause asthma, rhinoconjunctivitis or urticaria.<sup>16,17</sup> Additionally, contact dermatitis<sup>18</sup> from larvae of the maggot *Calliphora vomitoria*<sup>19</sup> and worms, such as *Lumbrinereis latreilli*<sup>20</sup> and *Nereis versicolor*<sup>21</sup>, and the midge *Chironomus thummi thummi*<sup>22</sup> may occur. Finally, fishermen may also present with allergic contact dermatitis caused by azo compounds used to dye maggots.<sup>23</sup>

##### Clinical presentation

Fishermen affected by live fish bait allergy present with pruritus and edema in both hands after manipulating fishing baits. These subjects may present with a hyperkeratotic dermatitis involving the volar aspect of the thumbs and index fingers bilaterally.<sup>19</sup>

##### Treatment

Avoidance of contact with the offending allergens results in gradual improvement.

#### Erysipeloid

##### Background

Erysipeloid, also known as “fish poison”, “shrimp poison”, “crab poison” and “scallop poison”, occurs commonly in fishermen when traumatized skin is infected by *Erysipelothrix rhusiopathiae*, a Gram-positive rod.<sup>24,25</sup> The organism causes three clinical forms of disease: localized cutaneous infections; disseminated cutaneous infections, and generalized infections.<sup>26</sup> The localized cutaneous form, also known as “erysipeloid of Rosenbach”, occurs most commonly.

##### Clinical presentation

Patients present with well-circumscribed, tender, violaceous, edematous plaques on the fingers and hands. As the lesions advance peripherally, the center commonly clears without desquamation or ulceration.<sup>27</sup> Vesicles may develop, but suppuration does not occur.<sup>25</sup> In the systemic form, subjects present with constitutional symptoms and may develop septicemia, arthritis, empyemas, endocarditis and cerebral abscesses.<sup>25,27,28</sup>

##### Treatment

Localized cutaneous and diffuse cutaneous forms resolve within 7 d of treatment with penicillin.<sup>29</sup> For systemic infections, treatment includes immediate therapy with large doses of penicillin G.<sup>25</sup>

**Rubber boot dermatitis**

*Background*

Fishermen may develop rubber boot dermatitis, a contact dermatitis caused by allergy to rubber fishing boots.<sup>30</sup>

*Clinical presentation*

An eczematous eruption occurs diffusely throughout the entire leg. If the condition is not treated at this stage, a pompholyx-like eruption may also appear on the palms and soles, producing scaling and thickening with exfoliation and fissuring.

*Treatment*

Affected fishermen require topical steroids and antihistamines; severe infections may necessitate oral steroids. Sensitized fishermen should avoid rubber boots. Boots made from polymerized synthetic plastics or leather substitute adequately.

**Chilblains**

*Background*

Chilblains, also known as “pernio”, “perniosis” or “kibe”, represent a superficial cold injury that occurs after hours of exposure to cold and wet conditions (at nonfreezing temperatures), such as those experienced by ice fishermen.<sup>31</sup>

*Clinical presentation*

Patients present with small, erythematous to erythrocyanotic macules and papules on the face, nose, ears or acral skin. Swelling, tenderness, burning or pruritus may also occur. Rarely, blistering is observed.<sup>32</sup>

*Treatment*

The management of chilblains consists of supportive therapy with gentle rewarming of the skin and application of a dry bandage. Elevation of the affected area may help in minimizing swelling.<sup>32</sup> Additionally, in a double-blind, placebo-controlled trial, nifedipine, a calcium channel blocker, was effective.<sup>33</sup>

**Cutaneous mucormycosis**

*Background*

Fishermen risk the development of cutaneous mucormycosis.<sup>34</sup> Mucormycosis is caused by species of the genera *Rhizopus*, *Mucor* and *Absidia*, which are molds found commonly in nature that grow on bread, fruit and leaves, as well as in the soil.<sup>35</sup> Systemic risk factors for infection include abnormal metabolic states such as diabetes and

immunodeficiency. Local risk factors include burns, the use of needles, insect bites and skin trauma. Extensive necrosis of the subcutaneous tissue may develop rapidly and may be followed by gangrene of the skin and systemic toxicity. Cutaneous infection carries a mortality rate of 16%.<sup>36</sup>

*Clinical presentation*

Clinically, cutaneous mucormycosis has an extremely variable presentation; it may present with indolent nonhealing ulcers or rapidly growing, necrotizing lesions.

*Treatment*

Early debridement of the infected and necrotic tissue may prevent the disease from spreading. Affected patients must receive immediate treatment with systemic amphotericin B.<sup>37</sup>

**Surfing**

**Surfer’s nodules**

*Background*

Traumatic nodules or surfer’s nodules occur most frequently on surfers’ bony prominences. It is likely that these result from repetitive contact between the surfboard and the bony prominence, which leads to local injury, hemorrhage and scar formation.<sup>38,39</sup> However, it has also been suggested that surfer’s nodules represent a foreign body reaction to sand or other foreign material.<sup>40</sup>

*Clinical presentation*

Five different clinical presentations of surfer’s nodules exist (Table 2).<sup>41</sup> Most commonly, athletes present with

**Table 2** Clinical presentations of surfer’s nodules

Common name	Manifestation and presentation
Surfer’s nodules (Type A)	Collagenomas on the anterior shin or dorsal aspect of foot near the metacarpophalangeal joints
Surfer’s knots (Type B: early)	Edematous soft tissue swellings on the dorsal aspect of foot
Surfer’s knots (Type B: late)	Fibrous nodules with bone spurs on the dorsal aspect of foot
Surfer’s cysts (Type C)	Ganglion-like cysts on the proximal dorsal aspect of foot
Surfer’s cysts (Type D)	Bursal cyst on the inferior knee
Surfer’s ulcers (Type E)	Granulomatous nodules on the knee that ulcerate

Adapted from *Sports Dermatology*.<sup>41</sup>



nontender, fibrotic nodules on the pretibial surface of the leg or the mid-dorsum of the foot. These lesions commonly represent collagenomas (nodules with increased amounts of collagen).<sup>42</sup>

#### *Treatment*

If significant hyperkeratosis arises, the clinician should treat these nodules with topical keratolytics, such as salicylic acid and lactic acid. Additional treatment options include intralesional steroids, topical steroids and surgical excision.<sup>41</sup> The use of protective padding on subjects' knees and ankles may prevent the development of surfers' nodules.<sup>42</sup>

### **Surf rider's dermatitis**

#### *Background*

Surf rider's dermatitis, an irritant contact dermatitis, occurs in surfers and individuals who ride belly boards, boogie boards and body boards. Major factors in the development of the eruption include: friction; shearing forces; occlusion, and pressure between the athlete's body and the board.<sup>43</sup> Additionally, subjects may develop allergies to combinations of board polymers and to the wax used on boards.<sup>44</sup>

#### *Clinical presentation*

Subjects develop painful erythema and edema of the nipples. Small abrasions and fissures may also occur.

#### *Treatment*

Surf rider's eruption represents a self-healing eruption. Affected subjects should wear soft clothing and protective dressings, and use analgesics as needed for pain relief.

### **Windsurfing**

#### **Wishbone dermatitis**

#### *Background*

Windsurfers use a black rubber handle known as the "wishbone" to maneuver the sail and direct the surfboard. Contact with this handle may cause an allergic contact dermatitis known as wishbone dermatitis or windsurfer dermatitis.<sup>44</sup>

#### *Clinical presentation*

Subjects present with erythematous, pruritic plaques on their palms.

#### *Treatment*

Susceptible windsurfers should replace the black rubber with aluminum to avoid this eruption.

### **Reactive forearm hyperemia**

#### *Background*

Reactive forearm hyperemia occurs commonly in competitive windsurfers as a result of prolonged isometric exercise.<sup>45</sup>

#### *Clinical presentation*

Diffuse, patchy erythema is apparent on the forearm.

#### *Treatment*

This condition resolves spontaneously.

### **Whitewater rafting**

#### **Staphylococcal furunculosis**

#### *Background*

Outbreaks of skin infections caused by *Staphylococcus aureus* occur among whitewater rafting guides in South Carolina, North Carolina and Tennessee.<sup>46</sup> These athletes often live in communal settings in close proximity with one another and frequently experience minor skin wounds from rafting. In addition, the moist environment on the skin of these individuals may increase the ability of staphylococci to cause infections.<sup>47</sup> Finally, the rafts themselves may serve as fomite transmitters.<sup>48</sup>

#### *Clinical presentation*

Tender, well-defined, erythematous, occasionally fluctuant nodules measuring 1–3 cm occur, primarily on the extremities (Fig. 3).

#### *Treatment*

Treatment requires warm water soaks, topical mupirocin, and incision and drainage; some subjects may require oral dicloxacillin or cephalexin. Subjects with localized disease caused by methicillin-resistant *S. aureus* (MRSA) may respond to topical mupirocin alone. The presence of numerous furuncles often requires treatment with trimethoprim-sulfamethoxazole, tetracyclines or clindamycin. Mupirocin-resistant strains of *S. aureus* also exist.

### **Water-skiing**

#### **Rope burns**

#### *Background*

Inexperienced water-skiers may develop rope burns across their thighs when they rise from a stationary sitting position in the water or when they fail to release the handle when falling backwards into the water.



**Figure 3** Tender, erythematous, fluctuant nodules, one with spontaneous drainage, are consistent with staphylococcal furunculosis

*Clinical presentation*

Athletes present with abrasions and contusions over the superior aspects of the anterior and medial thighs. Usually, these markings occur diagonally across the thighs and extend from the proximal anterior thigh to the medial aspect distally. Typically, they occur in a symmetrical linear configuration.

*Treatment*

These areas heal spontaneously within weeks.

**Aeromonas hydrophila infection**

*Background*

*Aeromonas hydrophila*, a facultative, anaerobic motile Gram-negative rod, inhabits freshwater lakes and streams and may cause severe soft tissue infections.<sup>49</sup> One report described a water-skier who developed an infection after the tow rope wrapped around the subject’s arm and caused a large open wound and severe contusion to the underlying muscle.<sup>49</sup> Infections may occur after warm water contaminates lacerations or puncture wounds on the scalp, torso, and extremities.<sup>50–53</sup> *Aeromonas hydrophila* folliculitis also occurs and should represent part of the clinician’s differential diagnosis when considering

causes of folliculitis, particularly hot tub folliculitis (caused by *Pseudomonas aeruginosa*).<sup>54</sup>

*Clinical presentation*

Although the condition occasionally presents as folliculitis, more typically individuals present with the rapid onset of cellulitis or an abscess after water contamination of a wound. Erythema, swelling and a foul odor likened to that of dead fish occur within the first 24 h.<sup>50,52,55</sup>

*Treatment*

Gentamicin cream has been efficacious for folliculitis. Severe infections require rapid surgical intervention and antibiotic therapy with oral aminoglycosides or third-generation cephalosporins.

**Other Watersports-related Dermatoses**

**Pityriasis versicolor**

*Background*

Pityriasis versicolor, a superficial fungal infection of the skin also known as “tinea versicolor”, “dermatomycosis furfuracea”, “tinea flava” and “achromia parasitica”, results from exposure to *Malassezia* spp., which are saprophytes that normally inhabit the skin. Tinea versicolor occurs most commonly in tropical or subtropical areas with hot, humid environments, where the incidence may be as high as 40%.<sup>56</sup> However, pityriasis versicolor also frequently occurs in temperate areas, where it accounts for up to 3% of patients seen by dermatologists during summer.<sup>57</sup> The great majority of cases occur in adolescents and youths, which might be attributable to hormonal changes and/or changes in the secretion of sebum.<sup>58,59</sup> Typically, affected areas include regions covered by clothing, especially the back and chest, which suggests that heat and moisture contribute to the development of the lesions. In general, athletes present with pityriasis versicolor more frequently than nonathletes.<sup>60,61</sup>

*Clinical presentation*

As its name suggests, pityriasis versicolor can manifest in multiple different colors, including white, pink, tan, dark brown and even black (Fig. 4). Subjects typically present with multiple macules or patches on the trunk (Fig. 5) and regions of normal skin between these areas.<sup>62</sup> Individual patches typically display a fine scale, although papules or annular plaques may occasionally be present. Affected individuals often complain of pruritus. Finally, the infection recurs commonly, at rates of 60% in the first year and 80% in the second year.<sup>57</sup>



**Figure 4** Multiple, scattered, white-to-pink macules, patches and thin plaques with overlying furfuraceous scale are characteristic of pityriasis versicolor



**Figure 5** Multiple hypopigmented macules coalescing into patches on the trunk are typical in pityriasis versicolor

#### Treatment

For mild to moderate disease, effective topical treatments include selenium sulfide 2.5%, sodium thiosulfate 25% with salicylic acid 1%, clotrimazole 1%, econazole 1%

and ketoconazole 2%. Patients with severe disease or frequent relapses may require systemic therapy with fluconazole or ketoconazole.<sup>63</sup>

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