Extreme Sports Dermatology

6

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6.1 Traumatic Conditions

Extreme athletes exercise at the margin of activity and as such experience intense physical forces inflicted by their sporting environment. The skin represents the first and foremost barrier between the athlete and this unforgiving environment.

6.1.1 Friction Bullae

Perhaps the most common of the skin conditions of the extreme athlete is bullae. Friction bullae result from the rapid cycling of one's skin over the athlete's equipment. Several factors increase the likelihood that an athlete will develop friction bullae. Heat, moisture, ill-fitted shoewear, and abrasive clothing all serve to increase the chance that an athlete will acquire a blister (Fig. 6.1).

These bullae, which result from splits in the epidermis at the level of the stratum granulosum, occur most frequently on the feet and hands, but can occur at any site wherein the skin becomes rubbed repeatedly. Once a split in the epidermis develops, the space fills with fluid and a tense blister forms. These bullae can cause discomfort and may hinder further activity [1].

While the diagnosis is often straightforward, the management and prevention of these lesions present challenges. Research reveals that a blister, which is repeatedly lanced and drained three times in 1 day, heals more rapidly and less likely develops secondary infection [2]. The clinician should lance the blister in a focal spot and take great care to keep the blister roof intact. No commercially available dressing possesses the ideal coverage of the wound base as well as the athlete's own skin.

Once lanced, the athlete should apply petroleum jelly and cover the area with an adherent dressing. Only rarely do these blisters become infected and require topical or oral antibiotics. Athletes can prevent bullae by essentially

Fig. 6.1 Friction bullae frequently occur on the heel

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decreasing the friction between their skin and the sporting environment.

Simply wearing synthetic moisture-wicking clothing keeps the skin relatively dry and cool and minimizes the production of bullae. Athletes who are particularly prone to blisters may need to wear protective gloves or double layer of socks. Applying petroleum jelly to areas of the skin prior to athletic activity further minimizes the bullae production. Athletes must also ensure that their footwear fits well as ill-fitting equipment produces loose or tight spots that create friction bullae [1].

6.1.2 Athlete's Toenail

Extreme athletes' nails experience enormous pressure and tension as a result of their activities. Abrupt and intense forces can completely remove a finger or toenail. More commonly, athletes develop nail changes related to chronic, low-grade pressure, and tugging. The changes related to these physical forces include longitudinal and transverse ridging, onycholysis (separation of the nail plate from the nail bed), discoloration around the periungual area, and calluses periungually (Fig. 6.2) [1, 3].

Extreme athletes must employ several techniques to prevent athlete's nail. All nails should be closely cut in a straight-across fashion that allows an equal distribution of the force created during the athlete's physical activity. Cutting nails in a curved manner places increase pressure on the middle portion of the nail. As the sport allows, wearing gloves also helps to reduce the friction and pressure experienced by fingernails. Extreme athletes need to ensure that their footwear has an adequate toe box [1]. Unique lacing techniques can also redistribute the physical forces away from the toenails and onto the ankle which is better suited to experience the forces that create long-term nail changes. To employ this lacing method, the athlete undoes both laces from the last eyelet; instead of crossing the lace into the opposite side's eyelet, one enters the eyelet on the same side such that two loops are generated. The free lace ends then are crossed and thread through the opposite loop. Then the athlete can tie the ends as usual [4].

6.1.3 Talon Noire

The significance of talon noire resides in the fact that this condition can confuse the clinician to believe that the athlete has warts or melanoma. Talon noire, otherwise known as black heel, occurs most commonly in younger athletes on the posterior lateral or medial heel (Fig. 6.3) [1]. Caused by friction with subsequent hemorrhage into the skin, talon noire is asymptomatic and requires no therapy [5].

Fig. 6.2 Athlete's nail demonstrates periungual change and transverse ridging and hemorrhage

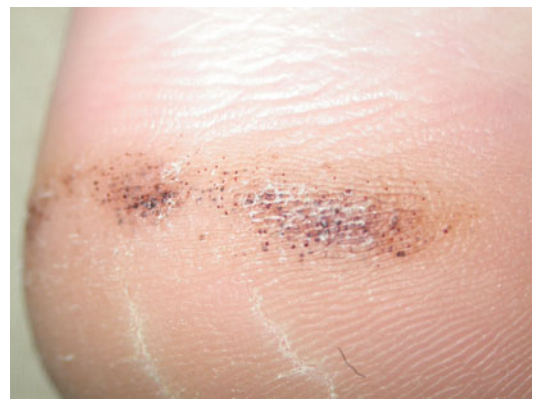

Fig. 6.3 This heel illustrates talon noire which can easily be confused with verruca (warts)

6.1.4 Piezogenic Pedal Papules

In addition to friction, pressure can also create havoc in an extreme athlete's skin. Piezogenic pedal papules primarily affect the feet of young women, and while most often not painful, the discomfort associated with the condition can prevent the endeavors on the extreme athlete. The subcutaneous fat and associated nerves and microvasculature protrude up into the dermis that can cause strangulation and subsequent pain [1]. Clinicians may misdiagnose the foot pain and embark on an extensive musculoskeletal work-up without having the athlete stand on only the affected extremity that then readily reveals the skin colored to yellow papules most often on the sides of the heel. Multiple therapies exist including intralesional steroids [6], compression [7], and acupuncture [8]. Susceptible athletes sometimes find heel pads prevent piezogenic pedal papules.

6.1.5 Athlete's Nodules

A combination of pressure and friction, particularly along the lower extremities, can cause a skin condition called athlete' nodules. Two mechanisms exist by which athletes can develop these lesions. First, surfers get "surfer's knots or nodules" on their legs as a result of pressure, friction, and rough board surface (along with sand) [9]. As surfers paddle out to catch waves (especially those in colder waters), they kneel on the board, and the combination of these factors and forces creates a foreign-body reaction in the skin. Second, these nodules can develop as a reaction to constant pressure in one particular location that most often related to protective equipment or shoewear. As a result, the dermis hypertrophies creating a collagenoma.

Regardless of the exact etiology, the differential diagnosis of these firms, skin colored to erythematous nodules can be vast. Atypical mycobacterial and deep fungal skin infections have this appearance, as do inflammatory conditions such as granuloma annulare and rheumatoid nodules. Primary and secondary malignancies can also share a similar morphology. While a biopsy will differentiate among these various cutaneous ailments, linking the lesion to one's athletic pursuits facilitates early accurate diagnosis.

Athlete's nodules may require excision, while others respond to intralesional steroids. Occasionally changing the equipment or footwear results in clearance. To prevent athlete's nodules, extreme athletes can wear padding between their skin and the offending piece of equipment [10]. In the case of surfer's knots, surfers may lie prone on the board to equally distribute forces along the board. Surfers, in colder waters, may wear a wet suit to comfortably allow a prone position.

6.1.6 Sunburns and Actinic Damage

Extreme athletes experience an enormously high level of ultraviolet radiation (UVR). As a result, these athletes ultimately risk acquiring skin cancer and actinic damage (wrinkles and dyspigmentation) (Figs. 6.4 and 6.5).

Several factors result in this intense UVR exposure. Athletes practice and compete during the time of peak UVR that is between 10 am and 4 pm. Additionally, they train for long periods of time and started this training often early in their life resulting in an immense total lifetime exposure. Sweating, inherent to most extreme

Fig. 6.4 Long-term, extreme athletes risk developing basal cell carcinoma. This photo depicts the characteristic pearly border and telangiectasias

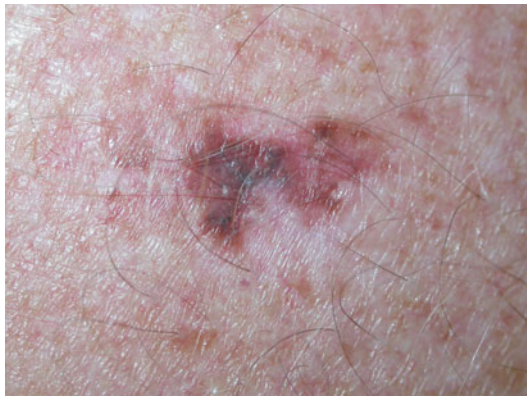

Fig. 6.5 Extreme athletes' skin endures enormous ultraviolet light that ultimately can create malignant melanoma

sports, enhances the potency of the UVR such that it takes 40 % less UVR to burn athletes if they did not sweat [11]. Several extreme sports exist at very high altitudes. At high altitudes, the atmosphere has not had a chance to filter a significant portion of UVR. For example, the UVR experienced high in the mountains is comparable to the UVR affecting an individual at sea level [12]. Lastly, extreme athletes who compete in snow and water environments must also contend with the significant reflection of UVR off the surfaces. Wearing hats that shade the face will provide no protection against UVR reflecting up to the athletes' face from the environment.

To prevent sunburns and long-term actinic damage, athletes must apply water- and sweat-resistant sunscreen and reapply the lotion or spray after practicing or competing. They should take care to apply areas that athletes often forget which include the ears and any part created by hairstyles. If possible, athletes should avoid the peak hours of UVR exposure and practice early morning or evening. Tightly woven and dark clothing provides ideal sun-blocking properties. While athletes traditionally prefer light-colored clothing to keep them relatively cool, the myriad commercially available synthetic moisture-wicking clothing allows the athlete to wear a sporting garment with both excellent UVR-blocking capabilities and good cooling qualities [1].

6.1.7 Miliaria Crystallina

Exposure to extraordinary heat and UVR plays a major role in many extreme sports. One relatively rare cutaneous condition that may occur more often in this population is miliaria crystallina. An affected athlete will develop delicate, crystal-like, small vesicles on their skin; unsuspecting clinicians may misdiagnose the lesions as herpes or another skin infection (Fig. 6.6).

Miliaria crystallina, which results from superficial obstruction of the eccrine duct, highlights the fierce heat that challenges the athlete. Wearing moisture-wicking, dark-colored synthetic clothing will assuage some of the affect of the heat [1].

6.1.8 Frostbite

While heat can cause many ailments in an athlete's skin, cold exposure poses its own challenges. Prolonged exposure to cold can cause significant damage to the cutaneous structures. Wind and moisture can exacerbate the issue. An extreme athlete with frostbite will initially complain of pain and develop erythema on the toes and fingers; as the condition progresses, necrosis ensues. To treat frostbite, clinicians should rapidly rewarm the area by dunking in 40 °C water [13]. This treatment should only occur if no chance of subsequent exposure to prolonged cold remains. Rewarming frostbitten skin and subsequently refreezing that skin result in maximal tissue damage. Extreme athletes whose environment includes freezing temperatures must use thermal clothing and gloves and chemical heating packets [1, 13].

6.1.9 Jellyfish Envenomations

While uncommon overall, extreme athletes risk encounters with water creatures that can affect their skin. Water-based extreme athletes may experience painful jellyfish stings from their long tentacles. Once the tentacles contact the skin, nematocysts fire and cause a linear, erythematous,

Fig. 6.6 The tiny blisters of miliaria crystallina are extremely fragile and rupture easily

and edematous eruption. Treatment includes removing the tentacles with tweezers and applying vinegar solution. Athletes and clinicians should avoid applying freshwater that can activate the nematocysts [1]. Extreme athletes who wish to enter seawater with jellyfish should minimize skin exposure by wearing wet suits as their sport allows.

Fig. 6.7 Eruptions with a linear arrangement strongly suggest an allergic contact dermatitis

6.2 Allergic Skin Reactions

Among the most common cutaneous ailments in extreme athletes, after traumatic skin events result from allergies. The main categories of allergy include allergic contact dermatitis, exercise-induced anaphylaxis, and urticaria.

6.2.1 Allergic Contact Dermatitis

In their sporting pursuits, extreme athletes can develop allergies to the various pieces of equipment necessary for their activity. Protective equipment commonly causes allergic contact dermatitis. Shin pads may contain urea formaldehyde and helmets may possess epoxy resins. Extreme athletes who contact tape containing formaldehyde resins or analgesic creams containing eucalyptus can also develop contact dermatitis [14]. Injured or pruritic athletes often reach for Benadryl spray which can create an allergic contact dermatitis.

Sensitized athletes will develop well-defined, erythematous, scaling eruption in a distribution corresponding to the area of equipment contact (Fig. 6.7).

Acute dermatitis will demonstrate small blisters (vesicles), whereas subacute dermatitis will lack vesicles and instead often display more scale and less erythema.

Allergic contact dermatitis responds well to topical steroids. Affected areas on the trunk, extremities, and scalp respond well to potent (class I) topical steroids. Athletes should use caution with topical steroids on the face (especially the eyelids), groin, and axilla. The latter two areas will experience occlusion, which enhance the potency of topical steroids. In this instance, potent topical steroids may more readily cause side effects that include hypopigmentation, skin thinning, erosions, and acquisition of telangiectasias. Sensitive areas such as these require no more than medium-potency topical steroids such as triamcinolone 0.1 % twice daily; low-potency topical steroids such as hydrocortisone 2.5 %

Table 6.1 Cutaneous allergy in athletes

Sports equipment	Offending agent	Location of eruption	Nonallergenic options
Analgesic cream	*Eucalyptus*	Focal	Hot/cold packs
Athletic tape	Formaldehyde resins	Focal	Acrylate tape
Helmets	Epoxy resins	Forehead, scalp	Silicone
Sailing wishbone	Thiorams	Hands	Aluminum
Shin pads	Urea formaldehyde	Shins	Synthetic padding at interface

twice daily most often will be effective. When athletes need to chronically use topical steroids for their dermatitis in the groin, axilla, or face, the clinician should consider using topical pimecrolimus or tacrolimus. These agents do not possess the potential to cause the side effects aforementioned [1].

To help prevent contact dermatitis, susceptible extreme athletes can use silicone helmets (instead of those containing epoxy resins). Placing a moisture-wicking barrier between the protective pads and the skin not only will provide a barrier between the pad and the skin but also will wick away moisture that would otherwise enhance leaching of the offending allergen from the equipment. Allergic athletes may use acrylate tape to help avoid dermatitis (Table 6.1).

6.2.2 Urticaria

Another somewhat common allergic skin reaction in athletes is the general entity of urticaria. Extreme athletes risk developing three types of urticaria: cholinergic, solar, and cold. While each condition culminates in pruritic, edematous, well-defined, effervescent papules and plaques, the etiologies and morphology differ among the three ailments. Cholinergic urticarias present as small wheals and result from an increase in an athlete's core body temperature; runners seem particularly prone. Cold urticaria occurs in athletes participating in winter or cold-water activities, and solar urticaria abruptly occurs (within minutes) after exposure to ultraviolet radiation. The ice cube test confirms the diagnosis of cold urticaria. An ice cube is placed on the athlete's skin, and after removal and the skin warms, a welt develops where the ice cube rested. Phototesting confirms the diagnosis of solar urticarial [1].

The treatment in all cases of urticaria includes scheduled (not as needed) oral antihistamines. While the eruption will likely last more than 24 h, each individual should not. Typical urticaria lesions resolve in a few hours, only to have another wheal develop elsewhere on the skin. Individual lesions that persist longer than 24 h should prompt biopsy and investigation for urticarial vasculitis. Oral histamines also help prevent each type of urticaria in susceptible athlete who should initiate administration before starting their activities [1]. Extreme athletes who develop cold urticaria should minimize exposed skin; likewise, those athletes who suffer from solar urticaria should employ sun safety measures including wearing broadband-blocking (UVA/UVB) SPF 50 sunscreen that resists water rinsing.

6.2.3 Exercise-Induced Anaphylaxis

Athletes of all types risk developing exercise-induced anaphylaxis if they possess the predisposition. For unclear reasons, runners seem particularly prone to develop the condition [15]. The name of the eruption misleads most clinicians as most cases of exercise-induced anaphylaxis create hemodynamic or respiratory collapse. Pruritus dominates as the most common symptom. Prolonged headaches may persist for days after athletic activity [16]. The angioedema of exercise-induced anaphylaxis affects the palms and soles (Table 6.2).

Athletes with vascular or respiratory compromise need rapid attention to stabilize. Affected should take scheduled oral antihistamines. Susceptible extreme athletes should always partici-

Table 6.2 Frequency of symptoms in exercise-induced anaphylaxis

Symptoms	Frequency (%)
Angioedema (palm or sole swelling)	72
Chest tightness	33
Dyspnea (shortness of breath)	50
Gastrointestinal distress	25
Pruritus (itching)	92
Urticaria (wheals)	86

Table 6.3 Risk factors in the development of *staphylococcal* skin infections

Activity	Relative risk of infection
Having adjacent lockers	60
Sharing towels	47
Sharing soap	15
Acquiring turf burns	7.2
Shaving body hair	6.1

pate with at least one other athlete and always carry an epinephrine pen. Two strategies exist to minimize the activation of exercise-induced anaphylaxis. First, avoiding eating immediately before exercising can mitigate attacks, and second, avoiding extreme temperatures (either excessively cold or hot) can likewise halt the onset of exercise-induced anaphylaxis [1, 15]. Lastly susceptible extreme athletes should never wear jewelry on their fingers or toes as the angioedema can create strangulation and cutting the jewelry off is necessary.

6.3 Cutaneous Infections

Extreme athletes also must contend with cutaneous infections that they acquire from the sporting environment. Bacteria, viruses, and fungi most commonly cause these infections.

6.3.1 Bacteria

6.3.1.1 Folliculitis, Impetigo, and Furunculosis

Staphylococcus and, less commonly, *Streptococcus* cause the vast majority of the bacterial infections that occur in extreme athletes. Traditionally the methicillin-sensitive variety of *Staphylococcus* dominated as the primary organism responsible for bacterial skin infections in athletes, but increasingly, the methicillin-resistant *Staphylococcus* aureus (MRSA) variant causes the *staphylococcal* infection [17]. Multiple factors place the extreme athletes at risk to develop *staphylococcal* infections [18–20] (Table 6.3).

The particular location within the skin structure of the infection determines how the eruption appears clinically. When these bacteria infect the superficial portion of the hair follicle, a follicular pustule with surrounding erythema develops; if the infection proceeds deeper into the hair follicle, a deeply erythematous papulonodule may form that represents furunculosis. If the superficial layers of the epidermis are infected, the athlete will demonstrate impetigo that clinically manifests as yellow (honey-colored) crust on an erythematous base [21].

Extreme athletes will acquire these infections either from the sporting environment or from direct skin-to-skin contact with other athletes. Multiple studies have carefully examined the risk factors involved in epidemics of skin infections in athletes. Common activities that risk acquiring the bacteria are sharing equipment, having previously injured skin, and acquiring turf burns. Researchers have also demonstrated high prevalence of MRSA colonization in many of the surfaces in the sporting environment [22]. Athletes themselves may also carry MRSA or MSSA within their nares. One study revealed that up to a quarter of collegiate football and lacrosse players at one school had MRSA in their nares during the season [23].

Once a bacterial infection is suspected, clinicians should confirm the diagnosis with cultures and sensitivities. One study noted that athletes who received empiric antibiotics without sensitivity testing had a 33 times more likely chance of reoccurrence [24]. Mild cases of folliculitis and impetigo often only need topical therapy with mupirocin twice daily for 5–7 days. Athletes with many lesions may require oral antibiotics. Impetigo, folliculitis, or furunculosis caused by MRSA responds to doxycycline, tetracycline, minocycline, or trimethoprim-sulfamethoxazole. The bacterial infections caused by MSSA clear with dicloxacillin or cephalexin. Clinicians also need to lance and drain furuncles [1, 17].

Extreme athletes can reduce the chance of acquiring these infections by decreasing the amount of exposed skin, not sharing equipment, and carefully washing after practice and competitions. Moisture-wicking, synthetic clothing with UPF (sun protection factor grading of clothes) will provide a barrier of protection for the athlete. Athletes, with positive nasal colonization and who suffer recurrent bouts of MRSA or MSSA skin infections, should use twice daily mupirocin for 7–10 days [1].

6.3.1.2 Pitted Keratolysis

Corynebacteria or *Micrococcus* causes pitted keratolysis, another bacterial skin infection. This cutaneous disorder occurs on the soles and mimics the clinical findings of tinea pedis (athlete's foot). The characteristic pits on the soles, especially the weight-bearing portion, distinguish it from tinea pedis (Fig. 6.8) [25].

Wood's lamp examination of the infected area fluoresces coral red. Topical clindamycin or benzoyl peroxide clears the infection. To prevent pitted keratolysis, extreme athletes should wear moisture-wicking, synthetic socks [21].

6.3.2 Viruses

In addition to bacterial infections, extreme athletes endure multiple attacks on their skin by various viruses.

6.3.2.1 Herpes Simplex Virus Infection

Extreme athletes develop herpes simplex virus infections (most commonly HSV-1) either from close skin contact with another infected athlete or from reactivation of a previously acquired herpes simplex infection. Exposure to ultraviolet radiation predictably causes this reactivation [26]. Extreme athletes whose activities involve snow and mountain are especially at risk. At high altitudes, the atmosphere filters little ultraviolet radiation so that the athlete's skin endures intense exposure. Furthermore snow can reflect as much as 100 % of the ultraviolet radiation so the athlete experiences a double dose of ultraviolet radiation.

Infected athletes will first experience a burning or tingling without any obvious skin changes. The lesions related to reactivation frequently occur on the lips, while the lesions acquired from skin-to-skin contact occur most commonly on the neck, face, and arms. Nonspecific erythema subsequently develops in the area, and a fully mature lesion demonstrates grouped vesicles on an erythematous base (Fig. 6.9) [27].

Until these characteristic findings develop, herpes simplex virus infections may mimic impetigo, tinea corporis, acne, and dermatitis. Culture or immunofluorescence confirms the diagnosis.

Two grams of valacyclovir taken twice in 1 day makes the lesion noninfectious after 5 days. Extreme athletes should only use their own equipment; they should also carefully apply sunscreen to their lips before sports participation to prevent

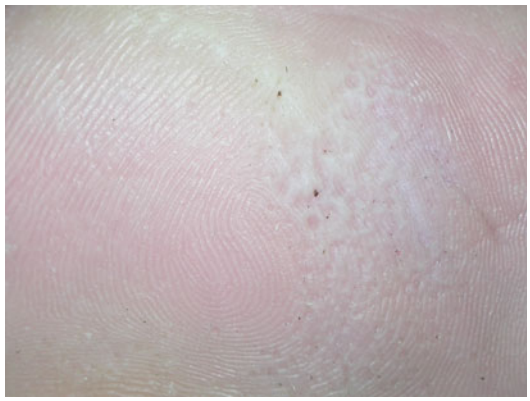

Fig. 6.8 Unlike tinea pedis, pitted keratolysis possesses craterlike pits on the sole

Fig. 6.9 Grouped vesicles on an erythematous base characterize herpes simplex virus infection of the skin

reactivation of herpes simplex virus infection [28]. Taking prophylactic oral valacyclovir (one gram daily) successfully decreases the incidence of herpes simplex virus infection [29].

6.3.2.2 Verruca (Warts)

Extreme athletes often acquire callosities. While these calluses often confer a protective quality for the extreme athlete, such thickened areas of the skin may harbor human papillomavirus (the cause of verruca). If an athlete develops pain in a callus, one should consider the possibility of a concomitant verruca. Classically, verruca demonstrates a well-defined, verrucous papule with black dots (Fig. 6.10).

With a sharp instrument, the clinician can pare the area to determine the etiology of the thickened area. A callus will maintain the presence of the skin markings, whereas a wart will lose the skin ridges and instead have black dots that represent capillary hemorrhages; a corn possesses a white central core [1, 21].

Destructive methods (most frequently involving liquid nitrogen) remain the mainstay of wart therapy; however, this approach results in pain and may thwart an extreme athlete's ability to continue the sport for several days. As such, more conservative measures suit athletes better. A slow approach to the treatment of warts includes soaking the wart for 10 min, scrubbing the area with a pumice stone, applying salicylic acid (16 %), and covering with duct tape. This procedure repeats nightly until the wart resolves [1]. Recalcitrant warts may necessitate using topical prescriptions (for instance, 5-fluorouracil or imiquimod) to replace the over-the-counter salicylic acid. Athletes must wear shoewear while walking along pool decks and in locker rooms and showers. When using weight-lifting equipment, extreme athletes should wear gloves that only they use; sharing this type of equipment facilitates the spread of warts [1].

6.3.3 Fungi

Fungal cutaneous infections also commonly occur in athletes and can affect their skin and nails.

6.3.3.1 Tinea Versicolor

Extreme athletes who compete in warm and humid condition often develop tinea versicolor. This skin ailment, caused by Pityrosporum, affects the upper layers of the epidermis and can cause dyspigmentation of the skin. The hypopigmented variety of tinea versicolor may resemble vitiligo, pityriasis alba (an eczema-like condition), hypopigmented seborrheic dermatitis, or progressive macular hypomelanosis. The hyperpigmented variety can confuse the clinician for acanthosis nigricans and confluent and reticulated papillomatosis of Gougerot and Carteaud (Fig. 6.11) [21].

Fig. 6.10 Paring this verruca would reveal the characteristic black dots of the pericapillary hemorrhages

Fig. 6.11 The scale of tinea versicolor may not be readily apparent until it is scraped with a glass slide

To confirm the diagnosis, the clinician can scrape the area with the edge of a glass slide to get sufficient scale on a separate glass slide. Addition of potassium hydroxide and examination under the microscope reveal multiple small round spores and short admixed hyphae. The combination of these two features is the so-called "spaghetti and meatballs" characteristic of tinea versicolor (Fig. 6.12) [1].

Both topical and oral therapies clear tinea versicolor. Affected athletes should apply selenium sulfide 2.5 % lotion or shampoo to the eruption and wash it off 10–15 min later. They should repeat this application daily for 1 week; to keep the eruption in remission, athletes can reapply the lotion or shampoo once weekly. Oral therapies with fluconazole can also clear the eruption and avoid potentially messy topical applications. These oral medications may cause significant side effects in athletes with preexisting liver problems or who take other medications that affect their liver [1].

6.3.3.2 Tinea Pedis

Extreme athletes who, to perform their sport, need to wear occlusive footwear risk developing tinea pedis. Epidemics have occurred in many athletes [30–33]. Tinea pedis, more commonly known as athlete's foot, can appear in three different morphologic manners. *Trichophyton rubrum* causes both interdigital and moccasin-like tinea pedis, while *Trichophyton mentagrophytes* causes the vesicular variety of athlete's foot. The former variants infrequently present with any symptoms, but the latter inflammatory infections frequently result in pruritus and irritation that prompts the infected to seek medical attention [1, 21].

Extreme athletes often believe that the relatively asymptomatic eruptions of interdigital or moccasin tinea pedis reflect, simply, dry skin. This disregard of their foot skin health can result in superinfection with bacteria. The inflammatory tinea pedis (vesicular type) causes redness, tiny blisters, and pruritus most frequently on the instep of the sole (Fig. 6.13).

Athletes and clinicians very often mistake this infection for an allergy to dyes in their socks or athletic footwear. Scraping the scale onto a glass slide to do a potassium hydroxide examination reveals long branching hyphae that typifies tinea pedis. Infected athletes need to apply topical fungicidal agents such as ciclopirox twice daily. Most clinicians prematurely discontinue this topical therapy; 8–12 weeks is often necessary for complete clearance. Occasionally, the athlete will have concomitant hyperkeratosis (very thick scaling skin) on the soles. In these cases, topical application will not sufficiently penetrate the thickened area. To facilitate the absorption of the medication, the athlete can first soak the affected area in lukewarm water for 5–10 min. Severe

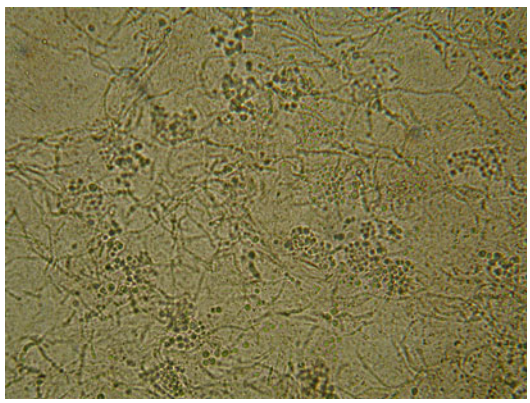

Fig. 6.12 The scale of tinea versicolor, once scraped and placed under the microscope, demonstrates short hyphae and groups of small round spores

Fig. 6.13 Extreme athletes with inflammatory (vesicular) tinea pedis often complain of pruritus

cases of tinea pedis may require oral antifungal agents daily for 4–6 weeks.

Recurrence is common, and as such athletes need to focus on prevention. During their pursuits, extreme athletes need to wear synthetic moisture-wicking socks that keep their feet relatively cool and dry. Novel new products such as cocona made, in part, from coconut shells represent a major advance in moisture-wicking technology. Additionally at-risk athletes should apply once weekly topical antifungal agents to their feet to help prevent infection. Lastly, no athlete should go barefoot on communal surfaces, such as shower floors, locker room floors, or pool decks [1].

6.3.3.3 Onychomycosis

The same fungal organisms that create athlete's foot can also infect the toenails. The hallmarks of onychomycosis include thickened, yet brittle, yellow nails with subungual debris (Fig. 6.14).

Similar findings occur in athletes' toenail but rather reflect a noninfectious entity caused by constant or abrupt trauma to the toenails. To complicate the accurate diagnosis even further, dystrophic nails of athlete's toenail more easily acquire secondary infection with dermatophyte [21]. To confirm the diagnosis of onychomycosis, clinicians should send the subungual debris to the laboratory for PAS examination [1]. Unfortunately, current oral therapies for onychomycosis fail to eradicate the organism in about half of the patients; furthermore, reinfection is very common. Infected athletes should not use the same nail clippers for affected and unaffected nails. Such indiscriminant use potentiates the spread from affected to unaffected nails.

Fig. 6.14 This athlete has developed fingernail onychomycosis as a result of their tinea manuum

Conclusion

Extreme athletes endure severe environments and their skin bears the brunt of this intensity. Infections, trauma, and allergies plague the athlete at every turn. Attention to preventative techniques helps assuage the damage to the athlete's cutaneous barrier. Rapid identification and treatment of these dermatologic problems allows the extreme athlete to continue to pursue their sport with the least disruption to their routine.

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