14. Pressure Injuries

This third chapter in the section on sports-related traumatic conditions reviews the effects of pressure. Generally, pressure, in this context, produces maximal damage to the skin when it is powerful and acute. Each sport creates different forces on the integument, so many of the disorders in this chapter are sport specific.

Black Heel

Epidemiology

Otherwise known as "talon noire," black heel has been reported more than 125 times in young individuals ranging in age from 12 to 24 years. The condition more rarely has been referred to as calcaneal petechiae, chromidrose plantaire, pseudochromidrose plantaire, and posttraumatic punctate hemorrhage of the skin. Basketball, football, lacrosse, soccer, and tennis players and weightlifters have developed black heel. In total, the male-to-female ratio is 1 : 1 (Wilkinson, 1977). Sheering forces, related to quick stops, starts, and jumps produce rupture of tiny blood vessels within the papillary dermis (superficial dermis).

Clinical Presentation

An asymptomatic, well-defined, linear, irregularly shaped, somewhat speckled black macule, varying in size but mostly less than 1 cm, is observed on the posterior heel of the athlete (Figure 14-1, see color plate). The plantar aspects of the toes can rarely be affected.

Diagnosis

The diagnosis can be challenging, especially when the clinician fails to incorporate the individual's sport. Athletes have undergone wide local excision of these lesions when the clinician mistook the black heel for melanoma. The differential diagnosis includes junctional melanocytic nevus (mole), melanoma, tinea nigra, and resolving verruca vulgaris (Levit, 1968; Nabai and Mehregan, 1970). Paring the edge of the lesion reveals the hemorrhage's very superficial nature. If melanoma is strongly suspected, a punch biopsy must be performed.

Figure 14-1. Irregularly shaped black macules and patches on the sole may be black heel or melanoma. Linear streaks and punctate lesions favor the former diagnosis. This lesion displays a black lesion typical of melanoma on the sole. (See color plate.)

Histopathologically, melanoma and black heel are easily differentiated. Black heel demonstrates "lakes of pigment" that stain for blood. A great deal of the hemorrhage escapes to the epidermis through sweat ducts (Casas and Woscoff, 1974).

Treatment

No treatment is needed. Paring the stratum corneum removes the hemorrhage.

Prevention

Some authors prevent black heel by placing a felt pad under the heel.

Black Palm

Epidemiology

Otherwise known as "mogul skier's palm," only one case report exists. Mogul skiers repeatedly and vigorously plant their poles in the snow as they make their tight turns. The hypothenar eminence experiences all the pressure from the plant as the skier speeds down the hill (Swinehart, 1992). Tennis and racquetball players and weightlifters can also develop black palm.

Clinical Presentation

In mogul skiers, the intense pressure exerted on the palm, especially the hypothenar eminence, produces a tender, ill-defined, large (several centimeters), golden brown, violaceous-red patch surrounded by ill-defined erythema. Over a period of days the lesion can become darker and more painful.

In tennis and racquetball players, the powerful ground strokes and serves result in sheering forces in the palm that produce well-defined, linear, speckled brown to black macules. Weightlifters develop the same clinical lesions as a result of abrupt and forceful trauma related to lifting huge weights (Izumi, 1974). These lesions on tennis and racquetball player's palms are most similar to that of black heel (talon noire).

Diagnosis

The diagnosis is made after discovering the correlation with mogul skiing, racquet sport, or weightlifting trauma. The differential diagnosis for mogal skiiers includes cold panniculitis, erythema multiforme, fixed drug eruption, insect bite reaction, lichen aureus, and neutrophilic eccrine hidradenitis. The differential diagnosis for black palm in racquet sport players is similar to that for black heel (talon noire).

Treatment

Localized heat, provided by over-the-counter warm packs, helps to clear the eruption. With discontinuation of mogul skiing, the skier will observe lesion clearance in 2 weeks. Treatment for black palm in racquet sport players is not necessary.

Prevention

Skiers can prevent these lesions by wearing padded gloves, changing their grip on the pole, and using less aggressive skiing moves.

Palmoplantar Eccrine Hidradenitis

Epidemiology

Also known as "idiopathic plantar hidradenitis," "neutrophilic eccrine hidradenitis" and "recurrent palmoplantar hidradenitis," fewer than 50 cases have been noted in the literature (Robinson et al., 2004). Athletes with intense physical activity have developed the condition. Reported athletes with this condition include baseball players, dancers, and mountaineers. I have seen these lesions in in-line skaters (rollerbladers) and runners. Young and otherwise very healthy children aged 4 to 12 years seem particularly vulnerable. Intense trauma on the soles or palms from sports combined with sweating may cause the rupture of eccrine glands. The rupture may activate the complement pathway and trigger a neutrophilic inflammatory response to the eccrine gland.

Clinical Presentation

Clinically, most lesions occur suddenly on either or both soles (rarely on the palms in baseball players) and appear as very tender, well-defined, erythematous, edematous plaques and nodules (Figure 14-2, see color plate). Young athletes may experience so much pain that they cannot walk. Relapses occur in 50%, and spontaneous remission is the rule.

Diagnosis

The diagnosis is dependent on the acumen of the clinician in inquiring about the sporting activity. Without this information, the diagnosis can be quite challenging. The differential diagnosis includes bacterial infection, chilblains, erythema elevatum diutinum, erythema nodosum, insect bite reaction, traumatic plantar urticaria, and vasculitis.

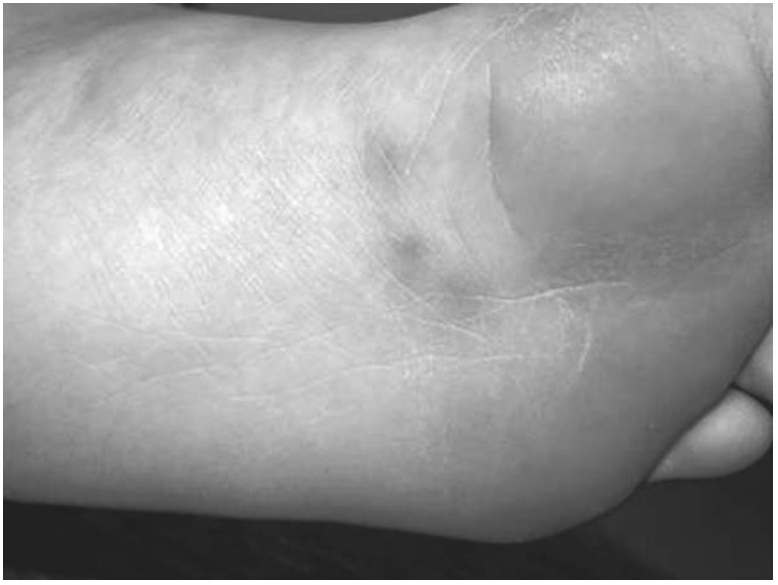

Figure 14-2. Eruption on the sole illustrates palmoplantar eccrine hidradenitis. (See color plate.)

Treatment

Palmoplantar eccrine hidradenitis clears spontaneously in 1 to 4 weeks. Warm compresses may assuage symptoms. However, the athlete may need to rest and take nonsteroidal antiinflammatory drugs (e.g., ibuprofen) because of severe pain.

Prevention

There are no effective preventative strategies.

Paintball Purpura

Epidemiology

No studies exist. Paintballs rocket at fast speeds (300 feet per second). The kinetic energy of a paintball is nearly five times as much as a speeding table tennis ball.

Clinical Presentation

A paintball's impact creates a 3-cm urticarial, hemorrhagic, well-defined plaque with central clearing. The pain associated with these lesions relates to the proximity of the shot. In general, close range shots result in greater pain. The lesions eventuate in ecchymoses that may not resolve for 10 to 14 days (Schnirring, 2004). Postinflammatory hypopigmentation or hyperpigmentation may result.

Diagnosis

The diagnosis is dependent on the acumen of the clinician in inquiring about the sporting activity. Without the history, the differential diagnosis includes erythema chronica migrans, erythema multiforme, fixed drug eruption, gyrate erythema, racquet sport patches, tinea corporis, and urticaria.

Treatment

Warm compresses water soaks for 5 to 10 minutes two or three times per day may assuage the pain. Nonsteroidal antiinflammatory drugs also may be required, depending on the pain.

Prevention

Individuals should wear loose-fitting clothes while playing paintball. Goggles, helmets, gloves, athletic cups, padded bras, elbow pads, and kneepads are a must.

Piezogenic Pedal Papules

Epidemiology

First reported in 1968 (Shelley and Rawnsley, 1968), piezogenic pedal papules have been reported nearly 400 times in the literature, with 4.4% of these cases sports-related (Redbord and Adams, 2006). In one study, the authors examined 412 consecutive patients and found that 2.5% had piezogenic pedal papules;

100% of these individuals had a history of vigorous physical activity (Kohn and Blasi, 1972). *Piezo* means "pressure" and *genic* means "giving rise to," which relates to the etiology of these papules. Long-distance runners demonstrate this condition.

Clinical Presentation

Piezogenic pedal papules are only recognizable upon application of pressure to the foot. Most piezogenic papules are not painful (90%), but they may be more apparent after prolonged exercise (e.g., during marathon training). The painful minority results from ischemia to blood vessels and nerves as the fat lobules herniate into the papillary dermis. It is believed that structural weaknesses in the connective tissue allow the fat to push into the upper layers of the skin. With this pressure, athletes notice multiple, less than 5-mm, well-defined, skin-colored, firm papules on the medial and lateral aspects of the heel (Figure 14-3, see color plate).

Diagnosis

The diagnosis of the painful variety of piezogenic pedal papules can be very challenging. In the case of painful piezogenic pedal papules, often clinicians perform an exhaustive search for a musculoskeletal cause. The diagnostic maneuver for piezogenic pedal papules may not be included in the typical evaluation of an athlete's foot pain. During this maneuver, the clinician observes the protrusion of the fat lobules through the skin on the heel as the athlete stands on one foot, applying as much force as possible. This maneuver not only may reveal the fat pad protrusion but also may reproduce the athlete's pain.

A biopsy is rarely performed but demonstrates thickened dermis, loss of the typical compartmentalization of the fat lobules, and thinning trabeculae in the subcutaneous fat.

Treatment

Successful treatment for symptomatic piezogenic pedal papules often is unsatisfactory. Strategies used include heel cups, compression stockings, acupuncture, intralesional steroids and anesthetics, avoidance of repeated foot trauma, and surgical excision (Woodrow et al., 1997).

Prevention

No satisfactory prevention exists, but some recommend heel cups.

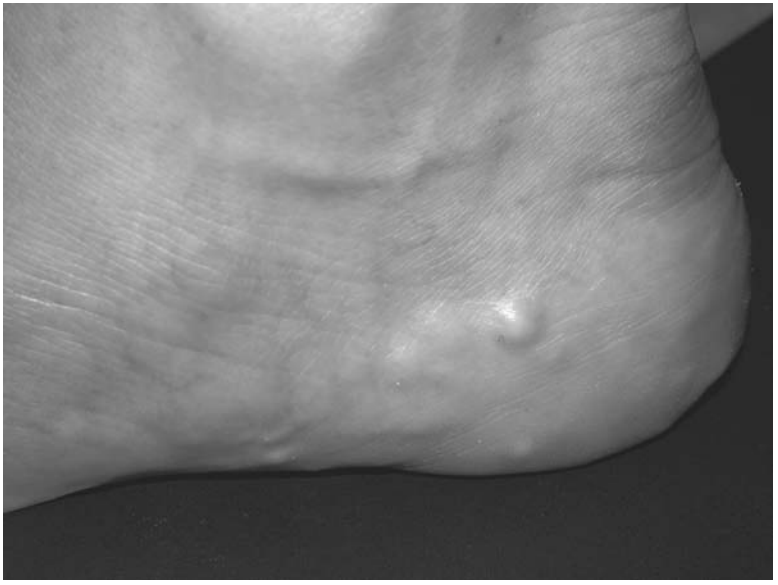

Figure 14-3. Medial and yellow to skin-colored papulonodules portray piezogenic pedal papules. (See color plate.)

Ping-Pong Patches

Epidemiology

Only one case of ping-pong patches exists (Scott and Scott, 1989). Table tennis balls move at speeds up to 100 miles/hour in elite play. Upon impact of the projectile on the skin, the ball indents centrally and the edges of the ball create intense pressure on the skin.

Clinical Presentation

The resulting skin lesion is an approximately 12- to 15-mm, annular (ring-shaped), erythematous plaque. The erythematous rim is less than 5 mm. Because the ball indents upon skin impact, a central clearing or zone of no erythema

exists. With enough velocity and force, the rim may also be purpuric. Most lesions resolve in 2 to 5 days.

Diagnosis

The diagnosis is dependent on the acumen of the clinician in inquiring about the sporting activity. Ping-pong patches and racquet sport patches may appear similar but vary in size. The size of a ping-pong ball is 38 mm, which creates a 12- to 15-mm diameter lesion. Squash ball patches are a bit larger, reflecting the ball's larger diameter (44 mm). Racquetball patches are the largest because the ball is the largest (55 mm). Without the history, the differential diagnosis includes erythema chronica migrans, erythema multiforme, fixed drug eruption, gyrate erythema, paintball purpura, tinea corporis, and urticaria.

Treatment

Warm compresses for 5–10 minutes two or three times per day may assuage the pain. Nonsteroidal antiinflammatory drugs may also be required, depending on the pain.

Prevention

No prevention exists.

Platform Purpura

Epidemiology

No epidemiologic studies of platform purpura exist. The force with which the diver enters the pool may transmit to the skin on the thighs in a missed dive.

Clinical Presentation

The resulting skin lesions are relatively symmetrical, variably painful, erythematous plaques. Depending on the force experienced by the thighs, purpura may develop. Most lesions resolve in several days.

Diagnosis

The diagnosis is dependent on the acumen of the clinician in inquiring about the sporting activity. Without the history, the differential diagnosis includes erythema multiforme, fixed drug eruption, a rare type of pigmented purpuric dermatosis, and urticaria.

Treatment

Warm compresses for 5 to 10 minutes two or three times per day may assuage the pain. Nonsteroidal antiinflammatory drugs may also be required, depending on the pain.

Prevention

Only dives with a perpendicular entry into the water will prevent the slapping force onto the thighs.

Port-Wine Stains

Epidemiology

Port-wine stains typically appear at birth; however, 59 cases of acquired port-wine stains are reported. Twenty-nine percent of the cases were related to antecedent trauma, of which 30% could be attributed to sports-related trauma (Adams and Lucky, 2000). It is believed that trauma results in either abnormal vascular repair or altered vascular innervation.

Clinical Presentation

Susceptible athletes may develop well-defined, violaceous, pink, or erythematous patches in areas of trauma. The patches are most commonly located on the face and less commonly on the extremities.

Diagnosis

The diagnosis often is made clinically, and the history of trauma supports the diagnosis. Biopsy may be necessary. The differential diagnosis includes arteriovenous malformations and cutis marmorata telangiectatica congenita, though neither of these is associated with sports trauma.

Treatment

Patients treated with pulsed-dye lasers have experienced an excellence response or complete clearance in 54% of the cases.

Prevention

Only avoidance of trauma can prevent acquired port-wine stains in predisposed individuals.

Powerlifter's Purpura

Epidemiology

One case report of powerlifter's purpura exists (Pierson and Suh, 2002).

Clinical Presentation

Purpura and petechiae result from ruptured blood vessels that can occur when powerlifting athletes increase their arterial pressure to levels as high as 450/380 mmHg. Weightlifters subsequently develop asymptomatic, numerous purpura and petechiae on the eyelids and anterior and lateral neck.

Diagnosis

The diagnosis often is made clinically, and the history of weightlifting exacerbating the condition supports the diagnosis. If the athlete has a history of fever, chills, or night sweats, a complete blood count should be performed to help evaluate for a blood disorder, such as lymphoma.

Treatment

No treatment but reassurance is required.

Prevention

No prevention exists.

Purpura of Prolonged Running

Epidemiology

Two case reports of purpura of prolonged running exist (Cohen, 1968; Latenser and Hempstead, 1985). Purpura and petechiae result from ruptured blood vessels. The factor that produce petechiae or purpura in runners includes increased transmural capillary pressure from the repetitive and intense pressure with every step of running. Preexisting solar damage results in decreased collagen and places small skin capillaries at increased risk for rupture.

Clinical Presentation

Well-defined, purpuric patches or petechial macules have been reported on the faces and ankles of runners. One runner developed subsequent facial purpura after his cheeks became bright red during a 20-mile run.

Diagnosis

The diagnosis often is made clinically, and the history of running exacerbating the condition supports the diagnosis. When this eruption occurs on the face, the condition may be confused for acne rosacea, lupus erythematosus, and seborrheic dermatitis. When this eruption occurs on the legs, the condition could be confused with pigmented purpuric dermatosis (a rare, often idiopathic skin disease). If the athlete has a history of fever, chills, or night sweats, a complete blood count should be performed to help evaluate for a blood disorder, such as lymphoma.

Treatment

No treatment exists.

Prevention

For the long term, patients should wear sunscreen to prevent thinning of the connective tissue that protects the tiny blood vessels in the superficial dermis.

Purpura Gogglorum

Epidemiology

Only one case report of purpura gogglorum in swimmers exists. Overtightening of elastic straps on leaky goggles leads to this skin problem.

Clinical Presentation

One swimmer developed an extensive, well-defined, purpuric patch over one eyelid after wearing new swimming goggles. The opposite eye piece started to leak during a swimming practice. Each time water entered the leaky eyepiece, the swimmer incrementally tightened the elastic band and pulled both eyepieces from her head to empty the water on the leaky side. After repeating this process several times, the swimmer effectively created significant negative pressure in the functioning eyepiece. This enormous suction broke the superficial blood vessels and produced purpura.

Diagnosis

The diagnosis could be quite challenging unless the history of swimming with goggles is obtained. Although the morphology of the lesions will be different, some clinicians might confuse purpura gogglorum with contact dermatitis related to the cushion seals.

Treatment

Treatment consists of a cool compress applied to the area for several minutes, several times per day. Swelling and purpura resolve within 1 day.

Prevention

Swimmers must discard goggles with inadequate seals. If the seal leaks during a swim, the swimmer should not incrementally pull tightly the elastic strap while also pulling on the goggles to empty them of water. Low-elasticity straps are helpful.

Racquet Sport Patches

Epidemiology

No studies of racquet sport patches exist.

Clinical Presentation

Hollow, firm rubber balls used in racquet sports travel at great speeds. Upon contact with the skin, the ball indents and creates a strong force along the edge of the ball that is in contact with the skin. All the energy of the ball is transferred to the skin in a ring (annular) pattern. The central area (the location of the ball's indentation) remains relatively unscathed (Figure 14-4, see color plate). The urticarial plaque usually resolves in a few hours. Hemorrhage, induced by an exceptional force, may take days or 1 week to resolve.

Diagnosis

The diagnosis is dependent on the acumen of the clinician in inquiring about the sporting activity. Ping-pong patches and racquet sport patches may appear similar but vary in size. The size of a ping-pong ball is 38 mm, which creates a 12- to 15-mm diameter lesion. Squash ball patches are a bit larger, reflecting the ball's larger diameter (44 mm). Racquetball patches are the largest because the ball is the largest (55 mm). Without the history, the differential diagnosis includes erythema chronica migrans, erythema multiforme, fixed drug eruption, gyrate erythema, paintball purpura, tinea corporis, and urticaria.

Treatment

Warm compresses for 5 to 10 minutes two or three times per day may assuage the pain. Nonsteroidal antiinflammatory drugs may also be required, depending on the pain.

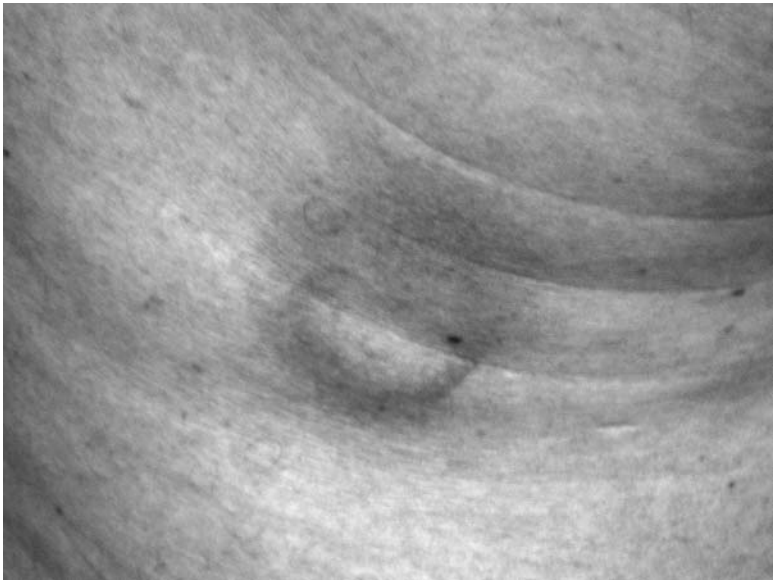

Figure 14-4. An erythematous plaque depicts one of the racquet sport patches. Note the central clearing. (See color plate.)

Prevention

Loose-fitting clothing may dampen the force of the ball, but welts may still develop beneath these clothes.

Stria Migrans

Epidemiology

One report of stria migrans in a weightlifter exists (Shelley and Cohen, 1964). This disorder contrasts with striae distensae, which is a relatively more common disorder representing wider and more numerous stretch scars in areas of high skin tension.

Clinical Presentation

From repeated trauma of lifting heavy weights, a linear, narrow, atrophic band extended symmetrically from a central portion on the lower back. The eventual length was 35 cm.

Diagnosis

The diagnosis is made clinically, in conjunction with a history of weightlifting.

Treatment

No successful treatments for striae exist. Topical retinoids, topical and intralesional steroids, and laser therapy have been used, with variable results.

Prevention

No evidence-based recommendation for prevention can be made. Athletes should not abruptly increase the amount of weightlifted.

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