Curr Rheumatol Rep (2013) 15:346
DOI 10.1007/s11926-013-0346-y

Spondyloarthritis Associated with Acne Conglobata, Hidradenitis Suppurativa and Dissecting Cellulitis of the Scalp: A Review with Illustrative Cases

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Abstract To review and highlight the association of acne conglobata, hidradenitis suppurativa, and dissecting cellulitis of the scalp with inflammatory arthritic conditions, we report five illustrative patients with this association, and a review of the literature. All our patients were African-American males, and their skin disease present before the onset of arthritis. Both asymmetric peripheral arthritis and axial disease can occur. The arthritis is usually insidious and lacks association with rheumatoid factor and HLA-B27. Imaging of peripheral joints can reveal erosions, periosteal bone reaction and new bone formation. When the axial skeleton is involved, imaging can reveal sacroiliitis, syndesmophyte formation. NSAIDs, oral and intra-articular steroids, DMARDs and TNF alpha antagonists have all been used with success. Controlled trials with larger numbers of patients are needed to assess which treatment options are the most effective for this group of patients.

Keywords Ankylosing spondylitis · Sacroiliitis · Spondyloarthropathy · Seronegative arthritis · Treatment · TNF-inhibitors · HLA-B27 · Acne conglobata · Hidradenitis suppurativa · Dissecting cellulitis of the scalp · Inflammatory arthritic

Introduction

Dermatological diseases that show an association with seronegative inflammatory arthritis but are under-recognized and inadequately managed include: acne conglobata, hidradenitis suppurativa, and dissecting cellulitis of the scalp [1–15, 16•, 17••, 18]. In this review, we first briefly describe the dermatologic manifestations of these diseases, and provide five illustrative case reports of the patients encountered at our center to highlight the clinical spectrum of the associated inflammatory arthritis. This is followed by the description of the clinical, laboratory and radiographic findings of the associated inflammatory arthritis and its management.

This article is part of the Topical Collection on *Seronegative Arthritis*

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Acne Conglobata

Acne conglobata is a highly inflammatory form of acne which usually presents as numerous comedones, nodules, papules, pustules, interconnecting abscesses and draining sinus tracts with associated scarring of the skin. Deep ulcers may form beneath the nodules leading to keloid-type scars. Occasionally, acne conglobata may develop in the setting of acne vulgaris that had been dormant for many years [19]. The lesions are usually found on the face, neck, chest, upper arms, buttocks and thighs. It is most common in teenage males but can occur in either sex and into adulthood [20].

This condition is different from acne fulminans, the most severe form of nodular acne, which is often classified with acne conglobata in the medical literature. Initially, the disease resembles acne conglobata with numerous lesions on the back and chest, although the neck and face are invariably spared. The distinguishing morphologic feature is the formation of hemorrhagic nodules and plaques which later ulcerate [21]. The onset of acne fulminans is more explosive, nodules and comedones are less common, ulcerative and crusted lesions are unique, and systemic symptoms such as fever, leukocytosis, polyarthralgia, myalgia, hepatosplenomegaly, and anemia are more

Published online: 15 June 2013

common [20]. It almost exclusively occurs in young men aged 13–16 years [21].

Hidradenitis Suppurativa

Hidradenitis suppurativa, also known as acne inversa, is a chronic and recurrent inflammatory skin disease that initially presents as tender subcutaneous nodules which coalesce into deep dermal abscesses [22]. The lesions occur most frequently in apocrine-gland bearing areas of the skin such as axillae, inguinal, perianal and perineal, mammary and inframammary, and buttock regions [22, 23]. Long thought to be a result of inflammation within the apocrine gland itself, many now believe the inciting factor is follicular plugging with resultant occlusion and rupture [24]. The subsequent influx of inflammatory cells leads to abscess formation and fistulous tracts. The disease typically occurs after puberty, with a peak incidence in the second or third decades, and is significantly more common in females [22]. Some authors have suggested a higher prevalence among African-Americans, but this has not been substantiated by studies examining racial predilection [24].

Dissecting Cellulitis of the Scalp

Dissecting cellulitis of the scalp, also called perifolliculitis capitis abscendens et suffodiens, is a rare, chronic, relapsing, suppurativa disease characterized by painful fluctuant scalp nodules and abscesses that heal with patchy areas of scarring and alopecia [16•]. The lesions usually begin on the occiput or vertex as a folliculitis and then expand into patches of perifollicular pustules, nodules, abscesses and sinuses [25]. This condition predominantly occurs in African-American men aged 20–40 years of age but has been described rarely in other ethnic groups as well as among females [25–27]. The etiology is unknown, but follicular occlusion, immune-mediated chronic inflammation, and infection have all been implicated in the pathogenesis [28].

Dissecting cellulitis of the scalp may occur alone, but when seen in combination with acne conglobata and hidradenitis suppurativa, is referred to as the follicular occlusion triad [16•, 29].

Historical Aspect

In 1959, Burns and Coleville [1] reported a case of a 16-year-old Caucasian male with fever, severe acne conglobata and arthralgia, with no objective joint findings. On follow-up, he later did develop erosive arthritis of the right knee [2]. There was also a report in 1961 of a 15-year-old Caucasian male with acne conglobata and associated arthritis in both ankles [3].

In 1981, one of us (M.A.K.) reported at the Cleveland Society of Rheumatology meeting of an African-American patient with HLA-B27 negative Reiter's-like reactive arthritis in association with hidradenitis suppurativa and pyoderma gangrenosum. Initially seen in 1971, a 20-year follow-up of this patient was presented in 1992 [4] and we now provide a 40-year follow-up (Case 1).

Rosner et al. described a similar spondyloarthropathy association with hidradenitis suppurativa and acne conglobata [5]. Ten adult patients were seen, and all but one were African-Americans. Similar case reports showed the same trend [6–10, 14]. Dissecting cellulitis of the scalp, a rare suppurativa disease characterized by painful scalp nodules and alopecia, has also been described either alone or in combination with acne or hidradenitis, with spondyloarthropathy [12, 29].

Illustrative Cases

Case 1 This case had previously been reported in 1981 and 1992, and we now provide another follow-up. He is an African-American, now 66 years old, who has had hidradenitis suppurativa since age 16, affecting the groin and axillary regions. He initially saw one of us (M.A.K.) in 1971 when he had presented with pain in the left wrist and hand, and episodes of pain and inflammation of the knees, ankles and feet. He had a past history of an episode of painful pustular lesions on his left leg that were diagnosed by skin biopsy as pyoderma gangrenosum. Gastrointestinal evaluation including barium enema and sigmoidoscopy were negative. He responded to treatment with short courses of prednisone, erythromycin and surgical excision of his hidradenitis lesions.

In June 1981, he developed increasing groin drainage accompanied by dactylitis of his right third finger and an inflammatory arthritis involving his right third metacarpophalangeal (MCP) and proximal interphalangeal (PIP) joints. Aspiration from the right third MCP joint revealed a white count of 16,000 with 89 % polymorphonuclear cells with negative gram stain and culture. One month later, he developed right groin and trochanteric pain with marked difficulty walking for which he was hospitalized. Physical examination demonstrated worsening of his acne and increased drainage of his groin abscesses. Joint pain and tenderness of the third MCP and PIP joint of the right hand persisted, and he was noted to have pain with external rotation of the hip. Erythrocyte sedimentation rate was 28. He lacked rheumatoid factor and HLA-B27, and his ANA was initially negative. Bone scan showed increased uptake in the symptomatic finger joints with mildly increased uptake over

the right hip joint. Hand films showed early erosive change in right MCP joint. Gram stain and culture of fluid obtained from right hip aspiration was negative. He was then started on prednisone 18 mg/day with prompt improvement in his joint symptoms as well as his skin lesions. His prednisone dose was gradually tapered off over the next several months, as his joint symptoms and skin lesions completely resolved.

He did not subsequently come for follow-up until September 2007, when he presented with pain in his left wrist and dorsum of the hand for 2 weeks. He stated that he had not had any severe flares of joint pain over the past 20 years until this episode. He denied any history of urinary or gastrointestinal symptoms, and had no history of physical injury. He stated that his hidradenitis had also been well controlled, but had recently developed one lesion involving his left earlobe. This time, his ANA was positive at 1:320. He was anti-dsDNA negative and with no clinical evidence of lupus or other related auto-immune diseases. On examination, the lesion on his earlobe was swollen and draining but he had no other active skin lesions. His left wrist and dorsum of the hand were swollen and tender, with pain on both active and passive range of motion. The wrist joint did not yield any fluid on aspiration and he responded to intra-articular triamcinolone hexoacetonide (Aristospan). The hidradenitis lesion of his left earlobe responded to intralesional injection of triamcinolone acetonide (Kenalog). Upon return to the clinic 2 weeks later, the wrist pain had improved but he had developed medial epicondylitis of his left elbow and tenosynovitis of the flexor tendon of left thumb. These responded very well to a short course of 20 mg of daily oral prednisone therapy which was then tapered. His residual hidradenitis lesion of his left earlobe also responded well to repeat intralesional triamcinolone injections. He has not come back for follow-up for his skin and joint symptoms.

Case 2 This is a 29-year-old African-American male who was referred to our clinic in 2002 for the evaluation of a positive anti-nuclear antibody (ANA) test. There was no clinical evidence of SLE. He stated that he had been seen at several emergency rooms for symptoms of inflammatory low back and neck pain with morning stiffness. He had been prescribed various muscle relaxants and non-steroidal anti-inflammatory drugs (NSAIDs) with minimal relief. His subsequent course had also been complicated by intermittent episodes of knee pain as well as heel pain which made it difficult to ambulate. He denied episodes of eye pain or redness, oral ulcers, genital discharge or urinary symptoms. He had noted a 40–pound (c. 18-kg) weight loss over the preceding 6 months. His family history was negative for inflammatory bowel disease (IBD), skin disease or spondylitis. He gave a long history of acne vulgaris, which began as a teenager, and more recently was treated with 2 weeks of rifampin and clindamycin in Dermatology clinic for acne as well as dissecting cellulitis of the scalp and sycoses barbae of the chin area. He was currently using transretinoin cream to the face and fluocinonide 0.05 % cream on the scalp.

On examination, he was noted to have eroded superficial scars with deep pits over the right cheek. Over the vertex of the scalp were a few abscesses and multiple, crusted tender nodules with patchy alopecia. He showed clinical features of ankylosing spondylitis. Axial rotations and lateral flexion of his neck were markedly restricted. Schober test showed limited lumbar spinal mobility (10 → 12 cm) He was also noted to have left Achilles tendonitis and warmth of the left knee with pain on terminal extension.

Laboratory studies were notable for thrombocytosis with platelet count of 633 and hemoglobin of 11.5 mg/dL with normal MCV. His ESR and CRP were 107 mm/h and 4.3 mg/dL, respectively. Pelvis x-ray revealed bilateral sacroiliitis with erosions and juxta-articular bony sclerosis. Lumbar spine x-ray revealed syndesmophyte formation along the lumbar vertebrae. The intervertebral disc spaces and vertebral body heights were intact. Imaging of the cervical spine, including magnetic resonance imaging (MRI) revealed bridging syndesmophytes from 3rd to 6th cervical vertebrae, with also some calcification of the anterior longitudinal ligament. HLA B27 test was negative.

His Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) was calculated to be 5.2 (on a scale of 0 to 10; 10 being worse) despite conventional treatment with NSAIDs. After obtaining a negative PPD and hepatitis serologies, he was begun on adalimumab 40 mg subcutaneously every other week for his spondylitis and Achilles tendonitis. There was marked symptomatic improvement, resolution of Achilles tendonitis and knee synovitis, and his BASDAI score decreased to 1.2. He did not come for follow-up for nearly 2 years because he had moved to California, but has remained on adalimumab every 2 weeks with continued excellent response. He recently returned back to Ohio and on follow-up in our clinic was found to be asymptomatic and free of any skin lesions.

Case 3 A 36-year = old African-American male was seen in November 2007 for a 3-month history of right hand and wrist pain with associated swelling. He had also noted intermittent pain in the third and fourth digit of his left hand as well as the right elbow, with only minimal relief with various NSAIDs. He denied any fever, weight loss, episodes of eye pain or redness, gastrointestinal or urinary symptoms, or back pain, but mentioned that he has had a large keloidal plaque at the base of his scalp which had been treated with triamcinolone acetonide injections by Dermatology in the past. There was no family history of psoriasis or IBD. On examination, there was a large keloidal plaque with crusted

areas over his posterior scalp. There was mild limitation of full extension at the right elbow. The right wrist had mildly increased warmth as well as tenderness and pain with range of motion. There was diffuse swelling of the digits with tenderness over several MCP and PIP joints of the right hand. There were no sausage digits. Laboratory studies showed an ESR of 42 mm/h and a CRP of 8.6 mg/dL. Rheumatoid factor and anti-CCP tests were negative. A right hand x-ray showed a small erosion at the base of the second proximal phalanx and a larger erosion of the triquetral carpal bone. MRI of the right wrist showed extensive synovitis within the wrist with associated erosive changes and marrow edema. Thickening of the tendon sheaths was also noted.

He was then started on methotrexate 15 mg/week and prednisone 10 mg/day with which he noted marked improvement in his joint symptoms. He was weaned off prednisone, and methotrexate was increased to 20 mg/week. He did well until September 2008 when he noted increased left hand pain and swelling. Concurrently with this arthritic flare, he noticed a draining lesion under the left armpit. Examination showed mild synovitis of the left wrist and left 2nd and 3rd MCP joint. His axillae showed draining sinus tracts which Dermatology confirmed were consistent with hidradenitis, a new diagnosis for this patient. He subsequently also developed left ankle and mid foot involvement as well as dactylitis of the right 3rd and 4th toes. These symptoms responded dramatically to prednisone 10 mg/day. Leflunomide 10 mg/day was also added to his regimen. His prednisone was subsequently weaned off and his joint symptoms have been stable. The hidradenitis lesions are being treated with dapsone by Dermatology. Interestingly, a repeat right hand x-ray showed marked improvement in the prominent demineralization which had been seen 1 year prior to starting DMARDs.

Case 4 A 29-year-old African American male, with a 9-year history of acne keloidalis, hidradenitis suppurativa and dissecting cellulitis of the scalp was referred to the arthritis clinic for evaluation of joint pains. The patient described a 4-month history of unbearable "soreness" in his neck, shoulders and upper chest region. He complained of episodes of migratory joint pain and swelling that would involve his knees, ankles, feet or fingers at various times and that would usually resolve spontaneously within 3 days. At the time of his visit, he complained of lower back pain of 2 weeks duration. The patient described stiffness in his lower back that would be worse after periods of inactivity and would improve after stretching and walking. He did not have any gastrointestinal symptoms and denied episodes of eye pain or redness.

The patient had been followed in the Dermatology clinic since 2001 when he developed acne-like lesions affecting his scalp and cheeks. He was diagnosed with acne, hidradenitis and dissecting cellulitis of the scalp. Treatment of his skin included multiple courses of antibiotics, dapsone, blue light and laser therapy.

On physical examination, he was noted to have scattered erythematous papules, nodules, cysts and pustules on his chin and over his occipital scalp and anterior chest area. There was no swelling or tenderness of his peripheral joints and he had no limitation of spinal range of motion. No sacroiliac joint tenderness was elicited.

Laboratory work revealed a low positive ANA 1:40, with a fine speckled pattern. His ENA panel was negative as was his rheumatoid factor. His CRP was 1.3 mg/dL. HLA-B27 was negative. Although ordered, the patient did not go to Radiology for imaging of his SI joints.

The patient was diagnosed with a form of reactive arthritis associated with his dissecting cellulitis, acne and hidradenitis. He responded very well to prednisone 20 mg with resolution of his symptoms. The patient was later put on sulfasalazine and the prednisone was tapered off.

Case 5 A 56-year-old African-American male was referred to the arthritis clinic for evaluation of bilateral hand pain. His symptoms started 3 years before with intermittent swelling of his fingers, and resulted in deformities particularly affecting his right hand. He was diagnosed with hidradenitis suppurativa at the age of 13 years. He described the pain in his hands as dull and aching, and it was exacerbated during flare-ups of his hidradenitis. The joint pains were only partially responsive to ibuprofen which he took 3 times a day. He denied fever, weight loss, back pain, episodes of eye pain or redness, gastrointestinal or urinary symptoms.

On exam, the patient was noted to have cystic acne involving the face and hidradenitis suppurativa lesions of his left axillae and bilateral groin areas. Examination of his joints revealed non-tender Boutonnière deformities of his right 2nd, 3rd and 4th fingers, with some warmth and tenderness of his right 5th DIP joint. Grip strength was reduced in his right hand. He had bilateral ankle warmth, tenderness and swelling. Examination of his spine and sacroiliac joints was normal.

Laboratory testing was notable for negative rheumatoid factor and negative antibodies to CCP. Imaging of his hands revealed an asymmetric erosive arthropathy mainly affecting the right 3rd MCP, carpal bones and ulnar styloid.

The patient was diagnosed with a reactive arthritis associated with his acne and hidradenitis suppurativa. He was started on prednisone 20 mg daily with good response. He was seen by Dermatology for treatment of his hidradenitis suppurativa, and was started on doxycycline, with subsequent improvement in his skin condition. The patient received intra-articular steroid injections to the right

wrist and right 2nd and 3rd PIPs due to persistent synovitis, with good response. At subsequent visits, his prednisone dose was tapered off.

Discussion

Table 1 summarizes the main characteristics of our cases. Interestingly, all our patients were African-American males. Although other races can be affected, prior published case series show predominance of African Americans [5, 13]. This predilection may partly be explained by the fact that hidradenitis suppurativa has a higher incidence in African-Americans [30]. This may also simply reflect the population served at our medical center in Cleveland, as is probably the case for the study done by Bhalla et al. in Chicago [13].

In all our cases, the skin condition was present before the onset of arthritis. The timing of the first onset of arthritis from the appearance of skin disease ranged from 2 to 40 years. Three of our patients clearly demonstrated a temporal relationship between arthritis flares and flares in their skin disease, a finding in keeping with prior published cases [13]. Four of the five patients we presented had features of a peripheral asymmetrical arthritis affecting the upper extremity joints in all cases. In two of the cases, the lower extremity joints were also affected. Three of the cases with available imaging revealed erosive changes on x-ray. Case 2 presented with axial symptoms due to spondylitis (with bilateral sacroiliitis and syndesmophytes), accompanied by knee synovitis and Achilles tendinitis. This patient was HLA-B27 negative. Case 4 had inflammatory back pain but did not have imaging to review.

Bhalla and Sequeira reviewed 29 cases of arthritis associated with hidradenitis and acne conglobata and summarized their findings [13]. Of these patients, 11 had hidradenitis alone, 5 had acne conglobata, 7 had both entities, and 6 fulfilled criteria for the follicular occlusion triad. The average age was 35 years with a male:female ratio of 20:9. African-Americans were the predominant ethnic group although five Caucasians and one Asian were also reported. There were no reports of constitutional symptoms such as fever or weight loss. Clinical characteristics include both an asymmetric peripheral arthritis and axial disease. Patients were noted to have an inflammatory oligoarthritis involving both upper and lower extremities. The knees were most commonly affected in this series, but the wrists, ankles, elbows and small joints of the hands and feet were also frequently involved.

Table 1 Summary of clinical and radiographic characteristics of five illustrative cases

	Case 1	Case 2	Case 3	Case 4	Case 5
Age/Sex/Race	66 M AA	29 M AA	36 M AA	29 M AA	56 M AA
Skin condition	HS	DCS	HS	HS	HS
	PG	Acne vulgaris	Keloid plaque	DCS	Cystic acne
		Sycoses barbae		Acne keloidalis	
Onset of skin disease (age in years)	16	Teenage years (13–18)	31	20	13
Onset of arthritis in relation to Skin Lesions	10 years after	5–10 years after (onset age 23)	2 years after	3 years after	40 years after
Type of arthritis	Peripheral (UE/LE)	Ankylosing spondylitis Peripheral (LE) Achilles tendonitis	Peripheral (UE)	Peripheral (UE/LE) Axial	Peripheral (UE)
		Migratory LE			
HLAB27/RF/ANA	(−)/(−)/[a]	(−)/NT/(+)	NT/(−)/NT	(−)/(−)/(+)	NT/(−)/NT
Imaging findings	Erosive (hand)	Syndesmophytes Sacroiliitis	Erosive (hand)	Unavailable	Erosive(hand)
Treatment	Oral CS	NSAIDS	Oral CS	Oral CS	Oral CS
	IA CS	Adalimumab	Methotrexate Leflunomide	Sulfasalazine	IA CS
Temporal relationship between skin and joint disease	Yes		Yes		Yes

NT Not tested, *CS* corticosteroids, *PG* pyoderma gangrenosum, *IA* intra-articular, *DCS* Dissecting cellulitis of scalp, *HS* hidradenitis suppurative, *UE/LE* upper extremity/lower extremity

[a] Initially negative, but became positive at 1:320 after several years. Anti-dsDNA negative and with no clinical evidence of lupus or other related auto-immune diseases

The arthritis associated with hidradenitis suppurativa is generally more asymmetric and peripheral on initial presentation, while axial involvement, which tends to be less severe and often asymptomatic, occurs later. In contrast, 72 % of acne conglobata patients have sacroiliitis that is more commonly symptomatic [13]. In 1993, Rosner et al. described 21 patients with hidradenitis and/or acne conglobata and an associated inflammatory arthropathy. Eighteen patients had a peripheral arthritis, 15 presented with axial disease and 12 patients exhibited symptoms of both [12]. Sacroiliitis is often unilateral .The cervical spine may also be involved though usually to a lesser degree than lumbosacral involvement. Three patients also had calcification of the anterior longitudinal ligament [13].

The onset of arthritis usually followed the skin condition by 1–20 years, but there have been case reports of arthritis preceding skin disease [6, 31]. Bhalla et al. noted exacerbation of joint symptoms coinciding with flares of skin disease in a majority of patients, a finding that has been noted in other series as well as in our patients [13]. Similarly, with dissecting cellulitis of the scalp, the arthritis tends to follow the remitting and relapsing activity of the skin disease [15].

There was a 40-year time lag between onset of skin lesions and arthritis for one of our patients, with the joint symptoms coinciding with flare-ups of his hidradenitis suppurativa. Another patient reported by Laber et al. had arthritis that started concurrently with development of acne conglobata but remained active 12 years after resolution of skin symptoms [18]. Persistence of these symptoms, and the occasional case reports of prolonged time lags between occurrence of skin disease and arthritis, led the authors to hypothesize that the associated arthritis is a chronic and progressive inflammatory disorder that becomes more apparent

The pathogenesis of this arthritis is unknown. The initial description of acne-associated arthralgia by Burns suggested the presence of septicemia [1], and many patients with acne fulminans have presented with septic pictures requiring extensive work-up. With very few exceptions though, bacterial cultures have been negative and the presence of infection as a possible pathophysiological mechanism have not been substantiated.

Windom speculated that the arthritis in acne conglobata represented an association similar to that observed with ulcerative colitis [3]. A possible mechanism postulated by some authors involves a hypersensitivity response to sebum, altered skin antigens, or bacterial antigens involved in acne [13, 32]. However, the fact that patients can present with arthritis before skin disease challenges this hypothesis [6, 31]. Reports of positive circulating immune complexes/ANAs [12] and response of some of the patients to prednisone and/or DMARDs may also indicate an autoimmune phenomenon.

Laboratory evaluation reveals a mild anemia, normal or moderately elevated white blood cell count and platelet count. Erythrocyte sedimentation rate is commonly elevated in these patients. Complement (C3 and C4) levels were elevated in a third of patients in Bhalla's series [13]. There is no association with rheumatoid factor [12, 13]. In one series, 6 out of 20 patients had a positive ANA test, with titers ranging from 1:20 to 1:640 [12]. ANA titers of 1:80 were found in 2 out of 9 patients in another series, which were negative when repeated [13]. One of our patients had a negative ANA test which later became positive at 1:320, with a negative anti-dsDNA and with no clinical evidence of lupus or other related auto-immune diseases. The majority of cases are HLA-B27 negative. The three patients that have been reported to possess HLA-B27 had grade 3 or 4 sacroiliitis [12, 17••].

The most common radiographic features in patients with arthritis-associated hidradenitis suppurativa and acne conglobata were peripheral joints erosions followed by periarticular osteoporosis, periosteal reaction and new bone formation [13]. Bony erosions were often noted bilaterally in symmetrical joints [12]. Others have noted similar radiographic findings as well as periarticular osteopenia [12]. Our first case was found to have erosion of the MCP joint of the finger affected with dactylitis; a similar occurrence has recently been reported [16•]. Axial skeletal involvement (with unilateral or bilateral sacroiliitis and spinal involvement with squaring of the vertebrae and syndesmophyte formation, often distributed asymmetrically) has been reported [12].

Treatment

Although NSAIDs can be beneficial, the response to NSAIDs in our patient group seemed to be suboptimal. Four out of five of our patients were started on oral corticosteroids. Two out of four patients were controlled with just oral corticosteroids and intra-articular injection of a few joints when needed. Non-biologic DMARDs were added in two cases, with sulfasalazine in case 4 and methotrexate in case 3. Case 2 who had mainly axial symptoms was treated with adalimumab with excellent and rapid response that has been sustained to date.

Treatment strategies recommended by Hazen et al. for hidradenitis suppurativa included antibiotics, intralesional or systemic steroids, electrosurgery, colchicine, dapsone, and biologics for early and middle stage disease, with excision or incision and drainage of affected areas for more advanced disease [33•]. Some patients reported improvement of arthritis after surgical therapy of scalp cellulitis and hidradenitis suppurativa [5]. Carbon dioxide laser excision and marsupialization offer a novel approach to the

management of persistent or late stage hidradenitis suppurativa lesions [33•], although the effect of this treatment on arthritis is unknown.

Various treatment modalities have been used in the management of arthritis associated with hidradenitis suppurativa, dissecting cellulitis of the scalp and acne. Nonsteroidal anti-inflammatory agents and prednisone [13–15] have been used with some success as well as disease modifying anti-rheumatic drugs (DMARDs) such as sulfasalazine [29] and methotrexate [13]. Libow et al. reported a marked improvement in arthritis in a patient with acne, hidradenitis and dissecting cellulitis of the scalp using oral isotretinoin [34], though cases of sacroiliitis induced by isotretinoin have also been described [35]. Some case series have also reported a favorable response to surgical excision of the hidradenitis lesions [13].

The off-label use of TNF antagonists is being increasingly reported to be effective in treating both the dermatologic and musculoskeletal manifestations of these diseases. Infliximab was first used for hidradenitis suppurativa in the setting of Crohn's disease, with improvement in both joint and cutaneous symptoms noted [36, 37]. Since then, cases of hidradenitis and acne conglobata as well as dissecting cellulitis of the scalp have been treated with infliximab, adalimumab and etanercept with success [17••, 19, 38•, 39•, 40–42]. Interestingly, however, cases of new-onset polyarthritis during successful treatment of hidradenitis suppurativa with Infliximab were recently described, with the underlying mechanism for this still unknown [39•]. Infliximab and adalimumab [17••, 43] have both been shown to be effective in patients with reactive arthritis or spondyloarthropathy in association with hidradenitis and acne conglobata. Our case 2 illustrates dramatic and sustained efficacy of adalimumab to treat dissecting cellulitis of the scalp and associated spondylitis and Achilles tendonitis resistant to conventional management.

Conclusions

In conclusion, the association of sero-negative arthritis with acne conglobata, hidradenitis suppurativa, and dissecting cellulitis of the scalp is now well established, but it is relatively uncommon and can be overlooked. To re-emphasize this association and to add to the current literature, we present these five illustrative cases. Both asymmetric peripheral arthritis and spondylitis can occur. Although not exclusive to African-Americans, there may be a predominance of arthritis in this group. The arthritis is usually insidious and occurs after the onset of the skin disease. In addition, a temporal relationship between flares in skin and joint disease is well described. Rheumatoid factor and HLA-B27 testing is usually negative in this group of patients. Imaging of peripheral joints may reveal erosions, periosteal bone reaction, and new bone formation. When the axial skeleton is involved, imaging can reveal sacroiliitis, syndesmophyte formation, squaring of the vertebrae, and, rarely, calcification of the anterior longitudinal ligament. NSAIDs, oral and intra-articular steroids, and DMARDs have all been used with success. As illustrated by one of our patients with ankylosing spondylitis and Achilles tendonitis resistant to conventional therapy, TNF alpha antagonists are dramatically effective. However, controlled trials with larger numbers of patients are needed to assess which treatment options are the most effective for this group of patients.

Compliance with Ethics Guidelines

Conflict of Interest Debbie T. Lim declares that she has no conflicts of interest.

Neena M. James declares that she has no conflicts of interest.

Sobia Hassan declares that she has no conflicts of interest.

Muhammad Asim Khan declares that he has no conflicts of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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- • Of importance
- •• Of major importance

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