

Adams Disease: Description and Management with Capsaicin and Heat

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Abstract: *Background/purpose:* This work describes a new skin disease for the first time, Adams disease, and the management of the disease. *Methods:* Adams disease is caused by chafing and irritations, causes the skin to form rashes or thickening, crack and bleed. The skin is also sensitive to temperature and moisture changes and responds with itching and pain. Other symptoms include a swollen lower leg and a retina tear. *Results:* Adams disease of the fingers responds to hot water treatments. Capsaicin cream is effective against rashes anywhere on the body and thickening of the palms and soles of the feet. The swollen lower leg responds temporarily to hot water and oral steroids. *Conclusion:* Adams disease may be an auto-inflammatory disease caused by dysfunctional transient receptor potential cation vanilloid 1 channels. The disease is chronic, has exacerbations and remissions and can be managed with hot water treatments and capsaicin cream.

Keywords: Adams disease, chronic skin disease, auto-inflammatory disease, TRPV1 receptors, capsaicin, heat.

INTRODUCTION

Adams disease is described here for the first time, affects the skin and other organs. Extensive literature searches, discussions with Dermatologists, internet postings and word of mouth have not revealed previous descriptions of the condition. The disease appears to be rare and can be managed as will be presented.

CASE PRESENTATION

Adams disease is primarily a skin disease. When the skin is wet and cold, such as after showering or swimming, severe itching and pain occur for about 20 min. Chafing results in hard rashes that require 2-4 months to resolve. Irritation of the fingers from chafing, detergents, hand creams, lanolin creams, ointments, latex gloves and rubber gloves causes pain, cracking and bleeding of the thumbs and fingers that require several months to resolve. These finger, palm and sole of the feet irritations (Fig. 1) do not respond to topical steroids, but do respond marginally and temporarily to oral steroids. The lower left leg has swollen to 44 cm at the calf for the past 6 years, compared to 41 cm for the right calf. This swelling responds temporarily to oral steroids. The swelling subsides somewhat in the morning and returns later in the day. A tear occurred in the left retina that required laser treatment. All blood chemistry findings are normal. The family history includes colitis in the father, reactive spondyl arthropathy in the mother, reactive psoriasis in a brother and reactive sarcoidosis in another brother.

Microscopic examination of the skin lesions demonstrates concentric accumulations of protein and inflammatory cells in the epidermis. Oil immersion examination of lower levels of the skin, especially the stratum granulosum, shows

eosinophils that accumulate eosin, but do not react with periodic acid Schiff stain. This is normal for eosinophils. The stratum granulosum also has the normal cells that produce keratohyalin granules. Examination of hematoxylin eosin stained skin samples shows there is no sign of fungi that should form abscesses full of hyphae and filaments, or have areas of light colored fungal bodies surrounded by clear mucinous capsules. The Malpighian layer of the skin has some areas that are normal and others that show cell death by necrosis and apoptosis. Periodic acid Schiff stain does not show signs of fungi that should stain pink or red with periodic acid Schiff stain. However, the concentric collections of protein in the epidermis stain red with periodic acid Schiff stain, demonstrating the presence of mucoprotein and implying that inflammatory cells are present.

MANAGEMENT

Pain and itching is managed by running 13 km every day and greatly diminishes symptoms from showering after exercise. The thumb and finger tips respond to hot water treatments. This involves dipping them quickly and repeatedly in water at 50-52 C, and increasing this until the fingers and thumbs can be held in the hot water for several seconds. This usually requires 5-10 min of treatment and is done once or twice daily for 4-6 days. Capsaicin cream used 4 days, twice daily helps the finger lesions and chafing rashes recover suggesting the disease is due to a malfunction of heat receptors known as transient receptor potential cation channel vanilloid1 (TRPV1) receptors.

DISCUSSION

Adams disease appears to be a chronic auto-inflammatory disease with exacerbations and remissions. It is not an autosomal dominant disease since only one member of the family is affected. Chafing rashes do not respond to antihistamines or topical steroids, but do respond marginally to oral steroids and respond well to capsaicin cream. Use of

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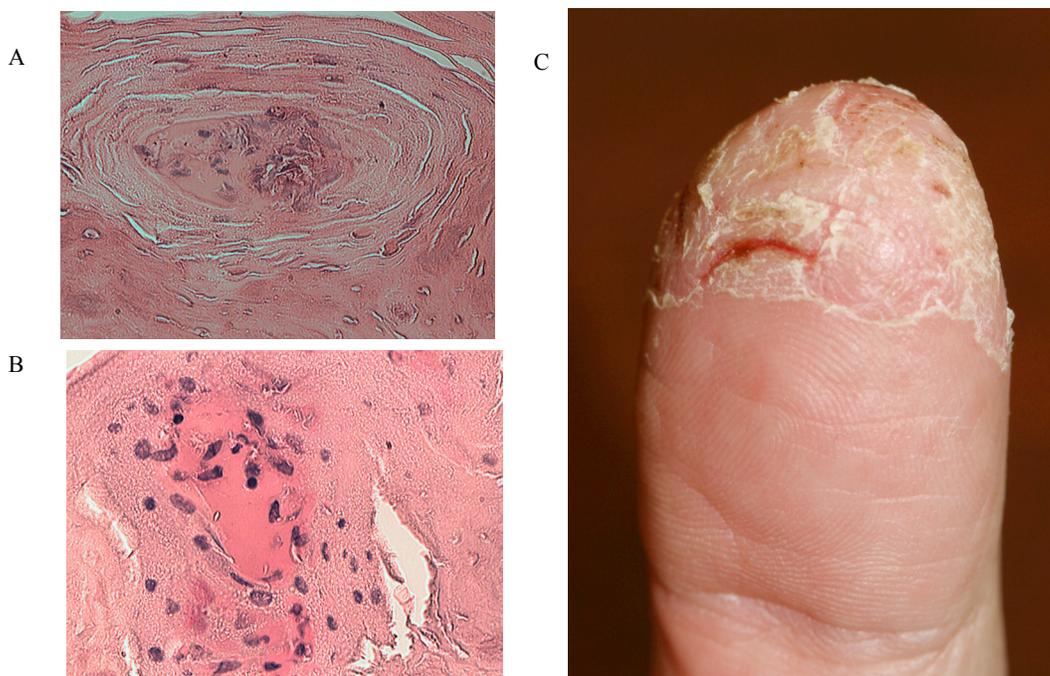


Fig. (1). Pathologic findings. **A.** Skin from the sole of the left foot, hematoxylin-eosin stained, showing a concentric area of protein and many inflammatory cells (original magnification X40). **B.** Skin from the sole of the left foot, periodic acid Schiff stain, showing an area of protein and many inflammatory cells (original magnification X40). **C.** Right thumb showing thickening, desquamation, cracking and bleeding.

topical steroids for more than a few days leads to increased papules. Leg edema responds for about 7 days, to oral steroids. Leg edema also responds for a few hours, to 15 min of hot water baths at 42 C, but does not respond to capsaicin cream. The fingers, palms and soles of the feet crack and bleed and may develop areas of thickened skin. This occurs due to chafing and irritation from daily exposure to detergents, steroids, creams, lotions, gloves, antifungal creams, antibiotic ointments and other preparations. Once the fingers, palms and soles crack and bleed, healing may not occur spontaneously and can persist for more than a year. The finger lesions seem to be prolonged by an auto-inflammatory process that responds to hot water treatments or capsaicin cream.

Rashes and hyperkeratotic plaques have been reported from chafing [1]. However, it is not known if the reported lesions respond to hot water treatments or capsaicin cream. Adams disease is similar to what the Chinese refer to as yang feng, cutaneous pruritus [2]. Both conditions can be managed by promoting blood circulation. The conditions differ in that Adams disease produces swelling, rashes and bleeding. Lab blood values including erythrocyte sedimentation rate and leukocyte counts are normal, suggesting the condition is not a cryopyrin associated periodic syndrome.

Capsaicin is a natural product from chili peppers (*Solanaceae*, genus *Capsicum*) and is responsible for most of the piquant flavor in peppers. Capsaicin creams are approved for use in pain relief as topical preparations. These creams should be applied to the locations where the pain is worse and are used daily. Capsaicin is trans-8-methyl-N-vanillyl-6-nonenamide. It is rapidly absorbed from the skin and appears in the blood in small amounts with a half life of 24 h [3].

Capsaicin is cleared from the blood by hepatic cytochrome P450 and appears in the urine as hydroxylated metabolites [3].

The molecular target of capsaicin is TRPV1 and similar TRP channels [3]. TRPV1 is a nonspecific ligand gated cation channel that is found extensively on sensory neurons, is made of six transmembrane domains, 838 amino acids and 95kDa [3]. The neurons involved are primary afferent peptidergic sensory neurons, especially the thinly myelinated A δ -delta and unmyelinated C fibers [4]. Endogenous agonists for TRPV1 include several endovanilloids and endocannabinoids [3]. Capsaicin is an agonist for TRPV1 causing the receptor to open allowing influx of sodium and calcium [5, 6]. At high enough doses, transient receptor opening is followed by long term receptor desensitization [5]. This is responsible for long term pain relief. In addition, TRPV1 opening triggers the release of neuropeptides such as substance P [3]. Depletion of substance P by TRPV1 opening is involved in some of the pain relief of capsaicin. At higher doses, capsaicin kills sensory neurons through an apoptosis like process [6]. Capsaicin interacts with a secondary target, epidermal growth factor receptor [7]. Interaction of capsaicin with this receptor may cause skin cancer [7].

TRPV1 is distributed in many tissues including brain, intestines, skin, bladder, kidneys, liver, mast cells, macrophages and neutrophils [3]. The possible physiological and pathological roles of TRPV1 include bladder function, thermoregulation, neurogenesis, blood pressure regulation, pain and heat sensation, exercise pressor response, neuropathic pain, joint inflammation, inflammatory bowel disease and other functions [3, 8, 9]. Regulation of TRPV1 occurs through phosphorylation and phosphatidylinositol 4,5-

bisphosphate accumulation [10, 11]. Phosphorylation of TRPV1 is accomplished by protein kinase C and A-kinase anchoring protein 150 [12].

Recent research has suggested that capsaicin may cause skin sensitivity in some people [13]. This hypothesis is supported by the fact that the TRPV1 channel responds to endogenous inflammatory agents such as bradykinin, toxic fatty acids, anandamide (an endocannabinoid) and trypsins that may be released by inflammatory cells [14]. Capsaicin in small doses, activates the TRPV1 channel and may be inflammatory. At higher doses, capsaicin causes TRPV1 long term deactivation. TRPV1 and TRPV4 channel deactivation by sufficient doses of capsaicin decreases long term pain, edema and inflammation in most patients [15, 16]. This may be responsible for the therapeutic effects of capsaicin and hot water in Adams disease.

It is not known how TRPV1 dysfunctions in Adams disease. Perhaps the receptor structure is different in Adams disease, possibly being made of subunits that differ from normal. Perhaps the receptor is regulated aberrantly in Adams disease. These are questions that are of interest in future research.

CONCLUSION

Adams disease can be painful and debilitating, but can be managed. The use of exercise, hot water and capsaicin cream is helpful. Patients with Adams disease must avoid daily exposure to topical steroids, some creams, lotions, ointments, detergents, latex gloves, nonlatex gloves, rubber gloves and chafing. Cracking and bleeding of the finger tips is especially troubling and can be managed with hot water treatments or capsaicin cream.

ACKNOWLEDGEMENT

None Declared

CONFLICT OF INTEREST

None Declared

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Received: July 29, 2011

Revised: October 13, 2011

Accepted: October 17, 2011

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