INSECTS AND ALLERGIC REACTIONS

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Abstrak


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Introduction

Insects constitute the largest class in numbers of species in the phylum Arthropoda. There are some 1,500,000 species of insects belonging to the Insect orders of major medical importance (Diptera, Siphonaptera, Hymenoptera, Coleoptera) and the Insect orders of minor medical importance (Anoplura, Hemiptera, Dictyoptera, Lepidoptera). They share the following arthropod characteristics segmented body with paired, segmented appendages, bilateral symmetry, chitinous exoskeleton and have the body divided into three distinct parts, the head, the thorax and the abdomen. The thorax bears three pairs of segmented legs and in addition usually two pairs of wings. (1)

Contact with insects through their bites or stings can result in adverse reactions in humans that range from mild annoyance to anaphylactic shock and death. Mosquitoes, lice, fleas and bedbugs inject salivary secretions and venoms through specially adapted mouth parts for piercing and sucking blood, whereas bees and ants inject venoms through specialized structure, the stinger.

Salivary secretions and venoms are capable of producing allergic reactions. Initially, there is no discernible response; this is followed by the appearance of only a delayed reaction. Both immediate and delayed reactions usually occur with further exposure. Development of an insect allergy is dependent not only on the species of insect and the size of infestations, but also on the type of allergens as well as the duration of exposure. Signs and symptoms of allergic reaction include pain, swelling of the throat, redness or discoloration at the site of bite/sting, itching, hives, decreased consciousness and difficult or noisy breathing including shock. (2)

This paper is aimed to review certain species of insects that give rise to allergic reactions, with special discussions on the morphology and habits, clinical picture, diagnosis and treatment.
Mosquito Bites

Morphology and habits

Mosquitoes belong to the order Diptera. They are slender and relatively small insects, usually measuring about 4-6 mm in insects, though some species, however, can be as small as 2-3 mm while others may be as long as 10 mm or more. This creature possesses conspicuous forward projecting proboscis as the piercing sucking mouth part. A female mosquito must bite a host/man and take a blood meal to obtain the necessary nutrients for the development of the eggs in the ovaries. In the process of biting mosquito injects saliva that contains coagulants and/or haemagglutinins into the dermis, and this acts as a sensitizer. Prominent immediate and delayed reactions occur commonly in the sites of mosquito bites, particularly in children. More severe local and/or systemic reactions occur much less commonly.

Clinical Picture

Bites from mosquito usually cause itching, red bumps, itchiness and a central raised dot in the swelling. In addition, mosquito bite is also characterized morphologically by the formation of erythematous papule, often urticarial in nature. A vesicle at the site, or even generalized urticaria may recult, but more commonly a pruritic papule forms at the inoculation site. In severe infestations, vesicular papules, vesicles or bullae may occur. This allergic reaction might sometimes last for several weeks and leaves hyper pigmentation. Exaggerated hypersensitivity responses to mosquito bites have been reported in patients suffering from chronic lymphatic leukemia.

Diagnosis

The diagnosis of mosquito bites is based on the history of an disorder, the presence of purities, and the morphology of the lesions. In the differential diagnosis, vasculitis and irritant contact dermatitis should be considered. The diagnosis of mosquito bites is also made by funding the mosquitoes that inhabit dwellings and their surroundings.

Treatment

Treatment of the patient due to mosquito bites is by means of tropical application of medication that kill the mosquito such as the use of calamine lotion with or without menthol and phenol. Localized application of patient with severe itching, will often markedly reduce the pruritus and inflammation.

Lice Infestation (Pediculosis)

Pediculosis is also referred to as lousiness. There distinct varieties of lice involved, are recognized as obligate parasites for humans. They are Pediculus humanus capitis (head louse), Pediculus humanus corporis (body louse) and Phthirus pubis (pubic or crab louse). They are members of the order Anoplura. Each variety of louse has a predilection for certain parts of the body, attaches itself to the skin and lives upon the blood that it sucks. In piercing the skin, louse exudates an antigenic salivary secretion producing an allergenic reaction. The mechanical puncture through the skin and secondary onfection due to scraching.

Pediculosis Capitis

Morphology and habits

The causative agent of pediculosis capitis is Pediculus humanus capitis. This louse is grey-white in colour, an active insect, 3-4 mm long, and the female being a little larger than the male. Both sexes are equipped with mouth parts adapted to sucking blood and legs adapted to grasping hairs. Adults feed voraciously on both the scalp and adjacent areas on the face and
neck. Pediculosis capitis is encountered principally in children, but occurs in adults too. Shared beds and interaction with playmates at school are the chief epidemiologic factors.

**Clinical picture**

The chief complaint in pediculosis capitis is usually itching on the scalp, neck and ears. It is also associated with rash and may be followed by irritability and depression. Itching is due to an allergic reaction to the bites. Because of the itching, secondary complications with impetigo and furunculosis are common. Owing to the secondary infection, the cervical and nuchal lymph glands may become enlarged. (5,6) Plica palonica is also known as the result of heavy secondary infestation due to pediculosis capitis that shows matting of the hairs produced by the presence of pus and exudates. (1)

**Diagnosis**

Though the diagnosis presents no difficulties, however, occasionally pediculi and nits/eggs are so sparse that repeated examination is necessary to discover them. Under Wood’s light, the nits fluoresce a pale blue, which facilitates harvest for examination. (5)

**Treatment**

Attention should be paid very carefully to treat head louse infestation. Patient with secondary infection due to pediculosis capitis should be first treated by the use of antibiotics to prevent intoxication of pediculicide that has been used. Effective drugs for the destruction of the lice and the ova are:

Lindane (gamma benzene hexachloride) shampoo (1%) may be thoroughly massaged into the scalp for 4-5 minutes, well rinsed out and the hair dried; remaining nits may be removed with a fine-tooth comb.

Acetylcholinesterase inhibiting insecticides malathion and carbaryl has replaced gamma benzene hexachlorine following evidence of the development of resistance to organochlorines. Malathion and carbaryl preparations should remain on the scalp for 12 hours before being washed off. Treatment should be repeated after 10 days. (7,8)

Payrethrins from the extract of Chrysanthemums and the synthetic pyrethroid permethrin have been extensively evaluated in the treatment of pediculosis capitis. They are applied to the scalp for 10 minutes and washed out. Retreatment in a week is recommended. (6) Topical crotamiton (10%) lotion has also been used and should remain for 24 hours application.

**Pediculosis corporis**

**Morphology and habits**

Pediculosis corporis is also known as pediculosis vestimenti or vagabond’s disease. (4) Pediculus human corporis is the cause of pediculosis corporis. This louse tends to aggregate in clothing most frequently touching the skin. For example you might find body lice on underwear, areas around the armpits, the waist-line, and neck. Body lice frequently remain on clothing but may be also found on the skin since these insects are highly dependent on the presence of their host. To live, adult lice as in the head lice, need to feed on blood as their nourishment.

**Clinical picture**

In most infested persons itching is the principal complaint, and the signs usually being confined to linear excoriations on the trunk and neck. Pruritus is the result of sensitization to salivary antigens. Close inspection may reveal hemorrhagic punctae or wheals from fresh bites. In those who have harbored body lice for long periods of time, as being continuously exposed, the skin is often hyper pigmented (so-called)
vagabond’s disease or morbus errorum), and this is probably a postinflammatory phenomenon.

**Diagnosis**

The diagnosis, as a rule, is readily established by the generalized itching, by parallel scratching marks, by hyperpigmentation, and by erythematous macules. Pruritus and urticaria may cause some confusion. The diagnosis is positively established by finding the lice or nits in the seams of clothing or in bedding sloth. In heavy infestation, lice and nits are easily found on scalp hairs.

**Treatment**

As in pediculosis capitis, treatment is with 1% lindane shampoo. All parts of the head and body should be lathered thoroughly for four minutes, and then rinsed free and towel dried. Infested clothing and bed linen should be heat washed or dry cleaned. Clothing could also be treated with gamma benzene hexachloride, permethrin and malathion dusting powder.

**Pediculosis Pubis**

**Morphology and habits**

This disease which is also referred as “phthiriasis” or “pediculosis ciliaris/palpebrarum”, is contacted chiefly by the adults as the result of sexual intercourse, and not infrequently from bedding. The cause of pediculosis pubis is Phthirus pubis (the body / crab louse). Crab louse is a rounded stubby louse, 2-3 mm long, and possesses the second and the third legs that terminate in to sturdy crab-like claws ideally suited in size and mechanical design to the task of grasping and holding on tightly to pubic and other body hair. The louse will colonize on the scalp hair, axillary hair, eyebrows, eyelashes, beard and hair on the trunk and limbs, in addition to pubic hair. This louse belongs to a vessel feeder (solenophages), introducing its mouth parts directly into a blood vessel to withdraw blood.

**Clinical picture**

The principal symptoms due to phthiriasis are itching, mainly in the evening and at night. Itching in the adults occurs mainly in the pubic area but also in the axillae. Bluegray macules (maculae caeruleae) are occasionally seen on the skin as the result of continuous feeding that do not itch. These macules about 0.5 cm in diameter, are located chiefly on the sides of the trunk and on the inner aspects of the thighs. Bullous lesions attributed to crab lice infestation also have been reported. In children exposed to heavy infestation in parents occasionally develop a troublesome infestation of the eyelashes know as pediculosis ciliaris/palpebrarum.

The patients complain of itching burning, and irritation of the eyes, and continually rub at them. The rising blepharitis is usually bilateral, and there are reddish crusting and matting of the eyelashes. Hoedojo in 1974 reported a patient suffered from general urticaria for more than ten years due to infestation of public lice as the disease was misdiagnosed and treated for other skin disease.

**Diagnosis**

Pediculosis pubis frequently co exists with other sexually transmitted diseases such as gonorrhea, syphilis, trichomoniasis and candidiasis, the diagnosis of pediculosis pubis, therefore, should be initiated by a search for the above mentioned sexually transmitted diseases.

**Treatment**

Application of lindane lotion or cream to infested areas should be made and washed off eight hours later. Whereas lindane shampoo is applied for four minutes and washed off following attention that it should
not be used in pregnant women or nursing mother. (7)
Permethrin 1% Cream Rinse is known to be safe and at least as effective as gammexane and application could be made for ten minutes and washed off. A second application is made in ten days. Therapy for mild eyelash infestation could be made by mechanical removal of lice and nits with fine forceps, after eight days (twice daily) of application of ordinary petrolatum. Fluorescein drops (concentrations of 10-20%) are also said to be effective. (7) All members of the family and sexual contacts who are infested should be treated at the same time. Clothing should be laundered and ironed. In the treatment of pediculosis capitis, corporis as well as pediculosis pubis, shaving the infested way to delouse lice infestations.

Flea bites

Morphology and habits

Fleas belong to the order Siphonaptera. These insects are small (1-8 mm long), wingless, laterally compressed creatures whose adults are blood-sucking ectoparasites of mammals and birds. The species most frequently parasitizing man, are cat and dog fleas (Ctenocephalides felis and Ctenocephalides canis), that is why persons in contact with cat and dog are frequently bitten. Some attacks are experienced by individuals moving into long emptied dwellings, but previously occupied by pet cats and dogs. Fleas are ubiquitous as are mosquito and live by attacking exposed skin and extracting blood from the superficial capillaries for the purpose of producing stimulant to lay eggs. When a flea bites for its blood meal, saliva (the allergen) is injected into the skin to prevent blood clotting.

Clinical Picture

The clinical picture due to the bites of C.felis and C.canis involves a patient complaining of itching with multiple centrally excoriated papules. The bites usually provoketypical popular urticaria often with a haemorrhagic punctum in a sensitized individual. Occasionally the reaction is more severe, and bullae may occur. The lesions may be grouped in lines or irregular clusters. (6,10)

Diagnosis

Lesions in relation to cat and dog flea bites occur predominantly on the legs below the knees and are most profuse around the ankles, but they can also occur on the forearm dependent on unprotected body parts. Examination of fleas collected from rooms with a vacuum cleaner or to visit the suspect premises is necessary. The presence of cat or dog in and surrounding the patient’s dwelling may help the confirmation of flea bites diagnosis. (10)

Treatment

Treatment of flea bites involves eradicating the fleas and symptomatic care of the pruritic lesions. Spraying by concentrating on the sleeping places of cats and dogs with Baygone inside the house or with Malathion as outdoor spray is experienced to be most effective. The pruritic skin lesions are best treated with calamine lotion with or without menthol (1%) and phenol (10%), or a potent topical corticosteroid cream or gel. (6,7)

Bedbug Bites

Morphology and habits

Bedbug belongs to the order Hemiptera. The two most common members, Cimex lectularius (the common bedbug) are primarily parasites of humans. C.hemipterus is restricted to tropical and subtropical regions including India, Myanmar, Malaysia and Indonesia. (1) Bedbugs are 4-5 mm in length, with dorsoventrally flattened, oval bodies, the forewings absent. The mouth part which consists of mandibles and maxillae is used at night or under subdued
light for feeding from blood vessels. During feeding the bedbug injects saliva containing an anticoagulant and anaesthetic. Reactions to bites are variable, depending on the allergic response.

**Clinical Picture**

The bites of the bedbug are usually painless seldom weaken the sleeper, and the attention of the victim is only drawn to the bites by the reaction they produce. The reaction evoked depends on the immunologic status of the host. Bedbug most often bites skin of the thigh, buttock, neck, and arms, but may occasionally bite other parts of the body. In the individual not sensitized by previous exposure there may be no symptoms at any stage, and only a purpuric macule indicates the site of the bite. In sensitized person intensely irritating oval or oblong wheals often as large as 3 cm, or papules surmounted by haemorrhagic puncta are the characteristic reaction. The bites are usually multiple and arranged in rows or clusters. In some cases where the reaction is severe, bullae predominate. (6,7)

Excoriations frequently arranged in parallel tracks of two or three, as the wheals are large enough to require multidigit scratching for satisfaction. In younger age groups, bedbug bites may cause popular urticaria. Repeated feedings of large numbers for iron deficiency in infants. (6)

**Diagnosis**

In establishing a diagnosis, the time at which lesions appear is an important consideration. When a child retires at night without lesions and regularly awakens, the presence of C.hemipterus should always be inspected.

**Treatment**

Antiprurutic lotions containing menthol or phenol could be used for treating bedbug bites. Topical steroid creams are effective, and in extensive reaction systemic antihistaminics are useful. (7)

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**Bee Stings**

**Morphology and habits**

Bees belong to the order Hymenoptera. Four families of Hymenoptera of special significance are: Apidae (the honey bee), Bombidae (the bumble bee), Vespidae (wasps, hornets, and yellow jackets), and Formidae (ants). These creatures have body regions consisting of head, thorax, and abdomen. Other morphological characteristics are the possession of two pairs of membraneous wing and lapping-sucking mouth parts. These insects have venom glands and specialized ovipositor that more or less is well adapted for piercing the skin. When man is stung by a honey bee, the bees unable to remove the stinger. The stinger and venom apparatus are evulsed from the bee’s abdomen in its struggle, but the venom apparatus continues to function and pump in more venom as this bee possesses a barbed stinger. On the countary, bumble bee possesses an unbarbed stinger, and is therefore able to sting repeatedly. (6)

Bees insert the posteriorly located stinger into the victim’s skin and may give rise to reactions varying from local discomfort to fatal anaphylaxis.

**Clinical Picture**

Honey bee’s venom contains polypeptide mellitin, phospholipase A2, histamine, hyaluronidase and apamin. Honey bee (Apis mellifera) sting, therefore, are dangerous essentially for individuals who are at risk. Systemic reactions from the sting may occur through multiple stings. Toxic reactions due to honey bee stings include vomiting, diarrhea, shock, and renal failure. Most fatalities due to the stings have followed the occurrence of more than 500 stings. (5,6)

**Diagnosis**

The first step in establishing the diagnosis is to know which types of bees the patient is allergic to. What usually occurs is
a local reaction, paint at the site of the sting and may be a small amount of swelling and redness that subsides after a few days. On the other hand, people who are allergic to bee sting might develop itching, hives, or wheals all over their body within minutes. When people have severe allergic reactions, they may be swelling around the ayes, lips, tongue or hand, and may feel like it is difficult breath get air and also have a drop in blood pressure, feel faint, even lose consciousness.

Treatment

Early removal of the stinger by simply squeezing and or pulling out could be conducted (1%), hyaluronidase, and lidocaine (2%) injected into the site provides immediate and often lasting relief. For patient with anaphylactic reaction treatment could be made by injecting (subcutaneously or intravenously, or by nebulizer), epinephrine, aminophylline, antihistamines, corticosteroids, and generally accepted antishock measures. The use of local ice packs and tourniquets is also common.

Conclusion

The cause of allergic reactions may be due to the bites of mosquitoes, lice, fleas, and bedbugs, or by way of the stings of bees. Symptoms of allergic reactions among other things include itching, hives, swelling, vomiting, diarrhea and shock. The diagnosis and treatment of allergic reactions are dependent on the species of insects and the diseases involved.

References