NATIONAL CENTER FOR CASE STUDY TEACHING IN SCIENCE

The Wandering Itch: A Dermatosis on the Rise

by
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Part I – The Student

Louise Chen, a 21-year-old college student, was completing her two weeks of shadowing in the office of Dr. McLennan, a podiatric physician and surgeon. They had just finished seeing a follow-up post-operative patient and were discussing the findings in Dr. McLennan's office.

"Well, Louise, that was a very good result. The patient will have a new lease on life after she has completely healed. I think we have one more patient before lunch."

"Yes, it's a male patient with a chief complaint of an itchy rash. However, he is here with his father and they want to be seen together. Apparently, they have the same rash! With everything I've observed over the past couple of weeks, and our humid climate here in South Florida, I'd guess it's probably tinea pedis," said Louise who was very proud of her recently gained knowledge.

"Is there any other information on the intake form? Any information on medical history, current or past?"

"Oh, yes; it says here that the father is on medication for hypertension, but no other medical problems for either of them. They deny any previous hospitalizations, have no allergies, and are up to date on their vaccinations."

Questions

1. What is the layman's term for tinea pedis? (Hint: the Latin root *ped* means foot.)

2. Is the causative agent of tinea pedis a bacterium, virus, or fungus?

3. What signs would you observe in a patient with a tinea pedis infection?

4. Can the causative agent result in signs and symptoms anywhere else on the body? What is this called both clinically and in layman's terms? (Hint: the Latin root *corpus* means body.)

Part II – The Chief Complaint

"Good morning, Mr. Roca. How are you today? This is Louise Chen, a student who is shadowing with me. Do you mind if she remains during the visit?" asked Dr. McLennan.

"Not at all," replied Mr. Roca. "This is my father, Carlos."

"Nice to meet you both. So, what brings you to the office today?"

"Well doctor," said Mr. Roca, "both my father and I have developed a very, very itchy rash on our feet. I can't describe how awful this is."

"I can't even sleep at night," added Carlos.

"Okay," said Dr. McLennan, "how long have you both had the rash? Did it develop with both of you at the same time? Have you tried any treatment?"

"It's been about two weeks, and we both noticed it about a day apart. I noticed it first. My wife suggested I apply calamine lotion, but it has not helped," said Carlos.

"I tried hydrocortisone cream and it helped ease the itch a bit, but not much," said Mr. Roca. "The worst thing is that it seems to be spreading!"

"Okay," said Dr. McLennan, "These are both over the counter (OTC) medications. I notice you're both wearing sandals, so why don't you remove them and I'll take a look."

Questions

1. What are the active ingredients in calamine lotion and what is its primary use?

2. What is the active ingredient in hydrocortisone ointment and what is its primary use?

3. Would either of these medications be effective in curing a tinea pedis infection? Give a reason for your answer.

Part III – The Diagnosis

"Yes," said Dr. McLennan, "I can definitely see the area of concern on you both. Do you mind if I ask my student a few questions as this is the best way for her to learn?"

Both patients consented. Dr. McLennan turned to Louise and asked, "Can you describe what you see and the location on both patients?"

Louise replied, "There is erythema or redness on the dorsal and plantar aspects of their feet and it extends up above the ankles to the lower leg; much more so for Carlos. There is also peeling of the skin, but ..."

"Go ahead Louise, describe what else you observe," encouraged Dr. McLennan.

"There are also red lines along the feet and lower legs."

"Very good, Louise," said Dr. McLennan. Turning to Mr. Roca, he asked him what his occupation was.

"Oh, my dad and I have our own lawn service company," said Mr. Roca.

"Do you wear shoes while working?"

"Oh, yes ...," began Mr. Roca, but Carlos interrupted and said, "Except at home."

"What do you mean?" asked Dr. McLennan.

"We can't wait to get home and out of our sneakers. Working in our own garden at home, why do we need shoes? I love to feel the cool grass under my feet and between my toes."

"Do you have pets? A dog or a cat?"

"Yes," smiled Mr. Roca, "we have two dogs, but we always clean up after them."

Louise was as surprised as the patients at Dr. McLennan's questions.

Dr. McLennan responded with, "You both have what is known as cutaneous larva migrans, or creeping eruption. It's caused by a hookworm that infects dogs and cats and enters the soil via their stool. From there it can penetrate human skin."

Questions

1. What do the terms "dorsal" and "plantar" mean when referring to the feet?

2. "Cutaneous larva migrans": analyze each word of the diagnosis to develop an initial understanding of the condition.

3. What is a nematode and which species most commonly causes cutaneous larva migrans?

4. Draw and describe the life cycle of *A. braziliense*.

5. Why are humans considered dead-end hosts? Consider the meaning of "dead-end" to help answer this question.

Part IV – Discussion

The patients were visibly surprised as Dr. McLennan explained to them that the larvae had penetrated their bare feet and were moving under the skin. This produced the visible lines and the intense itching. Noting their concern, the doctor assured them that the condition was treatable, and that they must take the necessary precautions of wearing foot gear in the yard at all times. He excused himself and Louise as he went to write the prescription.

"So, Louise, not a case of tinea pedis. Describe the red lines you observed," said Dr. McLennan.

"They weren't really lines, not straight anyway, more meandering," she replied.

"Exactly, that denotes the track of the larvae as they move through the epidermis."

"Only the epidermis?" asked Louise.

"Yes, that is why humans are dead-end hosts," explained the doctor.

Questions

1. The tracks of the larvae are described as "serpiginous." What does this mean? (Hint: the Latin root *serpere* means to creep.)

2. Name the two layers of the human skin. Are they vascular or avascular?

3. How are the larvae able to penetrate the human skin?

4. Why don't they penetrate down to the dermis? Does this relate to humans being "dead-end" hosts?

Part V – Treatment

"If humans are dead-end hosts," asked Louise, "doesn't that mean that the larvae will eventually die? Then why do we have to give medication?"

"Yes," said Dr. McLennan, "they will die eventually, anywhere from two to eight weeks, but do you want your patient to experience their symptoms for that length of time? Also, with them constantly scratching the areas, there is a risk of secondary infection."

"I understand," replied Louise.

Questions

1. Which would have the greater and quicker effect: topical or oral antihelmintic agents? What is meant by the word "helminth"?

2. What are the most common oral antihelmintic agents prescribed today?

3. What are the side effects of these medications and their major contraindications?

4. In what regions of the United States is cutaneous larva migrans most common?

5. Pertaining to Louise's question, would you choose to prescribe an oral antihelmintic agent or have the patient wait until the larvae die?

6. Create a patient education or public health pamphlet on cutaneous larva migrans that would be suitable for a doctor's office or clinic. This should include its mode of transmission, signs and symptoms, and prevention. Points to address:
   - What is CLM?
   - Sources of infection.
   - Signs and symptoms.
   - Diagnosis by a health care provider.
   - Treatment.
   - Prevention.