

Sunny Skies and a Lurking Microbe

by

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Part I – The PA

It had finally arrived! The day Margo had been waiting for—retirement day. And given that the temperature had hovered around 40 degrees the last week of March in Ohio, retirement along with the move to the warm south couldn't come soon enough. Most of Margo's belongings had been boxed up and sent on to Florida the previous week, but a few remaining items, including her wide screen TV, would be transported in the car.

Week of April 7th

The drive to Bradenton, Florida, went smoothly. After spending three days on the road, Margo arrived at the condo retirement community. It had all the luxuries one could imagine, including a spa-like pool area, a nail salon providing manis and pedis, a beauty shop, yoga studio, nutritionist, and therapeutic massage service. But before any of those amenities could be enjoyed, final moving efforts had to be undertaken. Although family had offered to help with the move, Margo wanted to do this solo, and felt there was nothing she couldn't lift or move herself—so she spent the rest of the afternoon rearranging and positioning the furniture, rugs, stereo, and computer equipment.

Week of April 14th

As she surveyed her new place the following week, Margo felt satisfied that her decision to move to Florida had been the right one and that her new condo suited her perfectly. One final move of the television away from the window and closer to her fireplace would be her last task. Unfortunately, while positioning the large flat screen, she caught her right index finger on the plastic trim, resulting in a painful cut that bled a little more than expected. But after washing the wound with soap and water, things seemed to be under control and the warm sun and balmy 80 degree temperatures made her think it was time for a swim. After the swim, a nice massage would prevent any aches and pains that might result from overdoing the furniture moving, and a manicure to repair the damage the manual labor had done to her nails would be the perfect end to the day.

Week of April 28th

Margo had been enjoying Florida-living for two weeks now. The only down side was the fact that the area where she had cut her fingertip was painful, swollen, appeared red, and felt warm to the touch. If the pain didn't go away soon, Margo was going to have to have her finger looked at by a physician. Then, in the middle of the next night, the throbbing became unbearable and she knew it was time to head to the doctor. Unfortunately, she hadn't had the time to find a personal physician in the area and so her only option was to go to the urgent care facility not far from her condo.

May 3rd

At the urgent care center, a physician's assistant (PA) asked Margo a variety of personal health questions and carried out his clinical assessment, noting the following details:

Age: 65

BP 134/80

Weight 120 lbs., Height 5'5"

HR 59

Respiration rate 18

O₂ sat. 99

Type 2 diabetes (diagnosed 3 years prior)

Following careful cleaning and examination of Margo's wound, the PA prescribed an antibiotic called Bactrim DS (trimethoprim/sulfamethoxazole-double strength) in a tablet form to be taken by mouth two times a day for 10 days. The patient information sheet that Margo received from the clinic identified her diagnosis as cellulitis, which was curious because the person who had examined her had not mentioned that particular word. Margo dutifully followed prescribing instructions, taking her medication as suggested, but after five days the wound continued to swell, her pain had increased, and moving her finger had become difficult.

Questions

1. List the various activities Margo engaged in from which she may have encountered a bacterial pathogen.
2. What is cellulitis? Name some infectious agents that are often implicated in the development of cellulitis.
3. List the variety of pathogens which Bactrim is typically used to treat.
4. Given Margo's vital signs and history, are there any factors that might result in a complicated recovery?

Group Discussion / Assignment

In paragraph form, identify the most likely microbe causing infection as well as the source of the microbe and expected treatment outcome. Justify your choices with explanations and cite details from the case study. Complete your assignment by providing a list of three to five reliable references you used to gather your supporting information.

Part II – The ARNP

May 8th

The next day, Margo went to another urgent care facility where she hoped she would find some relief. John, an Advanced Registered Nurse Practitioner (ARNP), took her history and performed his clinical assessment, noting a normal body temperature and normal-size lymph nodes. While examining the injured finger, he observed significant swelling, mild erythema, and a small wound with minimal clear exudate. Other than the index finger, the rest of Margo's hand appeared normal. Upon completing his examination, John cleaned the wound, numbed the area, and injected a medication called Depo-Medrol into Margo's finger. Afterwards, he talked to Margo about wound infections, including the redness and swelling she had been dealing with. John told Margo to clean her wound three times a day with soap and water and then to dry it thoroughly. He gave her a prescription for the antibiotic Keflex to be taken two times a day for 10 days. He also gave her a visit summary/discharge instruction paper that identified the clinical impression/diagnosis as "cellulitis/foreign body/fungi." John further instructed Margo to return in 72 hours if her symptoms did not improve.

Once home, Margo closely read the written information she had been given and noted that the document mentioned she had been taking the drug Septra since May 3rd without improvement. Also, her medical services/charge sheet noted "foreign body removal" as a procedure carried out, yet she had no memory of such a procedure. Although at the end of her clinical visit Margo had signed the paper acknowledging her treatment, she was now more confused than ever regarding the cause of her wound and the course of her treatment.

Questions

1. What is the function of Depo-Medrol? Speculate on the reasoning/consequences of its use in this particular case.
2. What pathogens are targeted by Keflex (the newest prescription)?
3. What types (genus/species) of fungal pathogens typically cause wound infections?
4. If a fungal pathogen was implicated, would Keflex eliminate that particular infectious agent?
5. Why did Margo's recent documents mention she was taking Septra rather than Bactrim as her earliest (May 3rd) documents listed?

Part III – The Physician

June 5th

Three weeks had passed. The swelling was still present and it had become even more difficult for Margo to move her finger. In addition, the amount of fluid oozing from the wound had increased, suggesting that the medication hadn't worked. It was now time to visit a local physician. Following the advice of a neighbor, Margo set up an office appointment with Dr. Chan, an internist. After the usual battery of questions, Dr. Chan sent in the nurse to collect a specimen from Margo's finger. Dr. Chan mentioned to Margo that the specimen would be sent off to the regional hospital laboratory for analysis and that he would provide her with another prescription for Keflex, which she should continue to take until test results came back.

June 15th

The test results arrived in Dr. Chan's office on June 15th and were as follows:

- No yeast or fungal elements were noted
- Gram-stain reaction: no organisms seen
- Culture of anaerobes and aerobes @48 hours yielded no growth
- Enrichment culture results: moderate growth on day 5 of an acid-fast bacterium (AFB).
 - Growth identified as *Mycobacterium fortuitum* by the Florida State Laboratory.

Armed with a microbial identification, Dr. Chan prescribed Doxycycline and Bactrim to be taken for four months. Dr. Chan also mentioned that the isolated organism was known to be found in tap water. Consequently, Margo planned to ask her condo community why an organism that could cause so much pain would be living in the water that was coming out of her faucets. And although she was annoyed to learn of the source of the organism, at least she could take some comfort in the fact that she finally had an accurate diagnosis and that by taking her medicine she could fully recover from her injury and start to enjoy her new home.

Questions

1. Compare and contrast aerobes and anaerobes. Why were no microbes noted upon aerobic and anaerobic culture?
2. Investigate the properties and characteristics of *M. fortuitum*. Where is this organism typically found (reservoirs)?
3. Why must the acid fast stain be performed to identify organisms of the genus *Mycobacterium*?
4. Why did Dr. Chan prescribe two antibiotics rather than only one?
5. How does doxycycline kill bacteria (cellular target)?
6. Why were the antibiotics prescribed for an extended period (4 months)?
7. No organisms were noted upon Gram staining, yet the enrichment culture yielded *M. fortuitum* after several days. Provide an explanation.

Group Discussion / Assignment

Having completed all three parts of the case, you are now ready to re-address the question posed in Part I of the case and retrospectively evaluate why it took almost two months to correctly identify the implicated etiological agent and treat the infection appropriately.

The Assignment

In narrative form, identify and discuss the most likely microbial etiology as well as the source of the microbe and expected treatment outcome. Justify your choices with explanations as well as citations of details from the entire case study.

Discuss any different conclusions you have now come to (compared to the first time you had this discussion). What details, if any, forced you to rethink your diagnosis/explanation? If you were acting as a care-giver, how would you have approached this problem differently to provide a more timely diagnosis and resolution to the problem? Complete your assignment by listing three to five reliable references that provided information to allow you to arrive at your conclusions.

Conclusion

Margo's infection eventually cleared after two months of treatment, although she continued to take her medication for the full four months as prescribed. Ultimately, her finger required physical therapy in order to again become fully functional because the infectious agent had caused some soft tissue destruction. When she inquired about the contaminant (*M. fortuitum*) being in the tap water, her condo Homeowners' Association (HOA) referred her to the officials at the Public Water System. Although the water department issued a report of elevated (yet within acceptable limits) xylenes in one monthly sample, they failed to acknowledge the presence of *M. fortuitum* and stated that they only screen the water supply for coliforms—and no other organisms.

Lesson learned: For the time being, Margo was careful to limit her use of the tap water in her condo to only certain activities such as those that required boiling water (cooking) and the use of large amounts of soap or detergent (bathing and laundry). In addition, the installation of a whole house ultra violet water purification system was her immediate renovation priority. After that installation, Margo could hopefully achieve some peace of mind and begin to fully enjoy her tropical paradise.



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