Session 2 | Sunday, August 22, 2021

Session Moderator: Dr. Pavia

Session Panelists: Drs. Aronoff, Chambers, Nelson, and Trautner

16 | Alpha-defensin PJI | Nelson

A 68-year-old woman underwent left hip arthroplasty 16 months ago for osteoarthritis. She had no perioperative complications and reported resolution of hip pain within 2 months of surgery. However, she has had slowly increasing pain over the last six months and her ability to walk longer distances has been compromised.

Her hip examination is normal.

ESR is 28 mm/h and CRP is 9.5 mg/L.

On plain films, the hardware is in good position without periprosthetic lucency. Three phase bone scintigraphy reveals diffuse uptake on early and delayed phases. Percutaneous synovial fluid sampling demonstrated 1895 nucleated white blood cells with 64% neutrophils.

Culture recovered a single colony of coagulase-negative Staphylococcus. Lateral flow alpha defensin is positive.

Of the available tests, which is most consistent with infection?

A. Triple phase bone scan
B. Erythrocyte sedimentation rate (ESR)
C. Synovial fluid nucleated cell count
D. Synovial fluid culture
E. **Synovial fluid alpha-defensin**

Correct answer: **Synovial fluid alpha-defensin**

The diagnosis of chronic periprosthetic infection is challenging, as clinical and radiographic findings are not specific for infection, and associated inflammation may be modest. A sinus tract that extends to the joint and/or a positive synovial fluid culture for a virulent organism would be diagnostic of infection, but these are insensitive for infection.

Plain films may be normal in chronic periprosthetic infection, or may demonstrate osteolysis or periprosthetic lucency; these can also be seen in aseptic loosening.

Triple-phase bone scan is useful when negative, however increased uptake is non-specific, especially in the first two years after arthroplasty.

Markers of inflammation such as erythrocyte sedimentation rate and C-reactive protein are often elevated but may be normal; values over 30 (ESR) and 10 mg/L (CRP) are more compatible with chronic periprosthetic infection.

Synovial fluid WBC and differential have high diagnostic accuracy; a synovial fluid WBC threshold of 3000 cells/µL is generally used; lower cell counts do not exclude infection but are less specific.

Most chronic periprosthetic infection is caused by commensal flora; however percutaneous sampling can also be contaminated with skin flora. Therefore, the predictive value of a single positive synovial fluid sample for cutaneous flora in limited quantity is low.

Alpha defensin is a biomarker that is produced by activated neutrophils and macrophages; when tested in synovial fluid it has high sensitivity and specificity for periprosthetic infection. While not a stand-alone test, it is increasingly being used to assess the likelihood of periprosthetic infection when other diagnostic tests are less clear.

17 | Wound Vac for Decubitus | Nelson

An 85-year-old woman with vascular dementia, history of stroke, and atrial fibrillation requiring anticoagulation is hospitalized for failure to thrive with a 30 lb weight loss over 3 months.

She was previously ambulatory after her stroke but since has become bedbound, and her daughter has had difficulty providing care for her.

On examination she is cachectic. She has a low-grade temperature and mild tachycardia (heart rate 112 bpm) with a normal blood pressure.

There is a large unstageable sacral ulcer with superficial tissue necrosis and malodor. There is mild surrounding erythema and the skin is tender, but there is no fluctuance or crepitus. Movement is painful.

Her creatinine is 0.28 mg/dL. Albumin is 2.1 g/dL. WBC is 16.3 x 10^3/µL. Hgb is 9 g/dL. ESR is 71 mm/Hr. CRP is 94.7 mg/L.

Plain films of the pelvis are normal.

She is started on piperacillin-tazobactam.

In addition to offloading and nutritional optimization, what is the next best management option for her infected sacral ulcer?

A. Local wound care with antimicrobial dressing
B. Place PICC line for six weeks of IV antimicrobial therapy
C. Assess for osteomyelitis with MRI
D. **Surgical debridement and placement of negative pressure wound dressing (vacuum-assisted closure)**
E. Diverting colostomy to minimize ongoing fecal contamination

Correct Answer: **Surgical debridement and placement of negative pressure wound dressing (vacuum-assisted closure)**

Decubitus ulcers occur when external pressure exceeds local capillary perfusion pressure, leading to hypoperfusion and skin breakdown. Similar to diabetic ulcers, decubitus ulcers are not always infected, and do not always require antibiotic therapy. Management consists of addressing the root causes, including nutritional optimization, offloading and frequent re-positioning, addressing associated incontinence, and local wound care.

Infected decubitus ulcers may be associated with both acute and chronic osteomyelitis. MRI is sensitive but not specific for decubitus osteomyelitis, as bone marrow edema is commonly seen with pressure-related osseous changes. Bone culture and histopathology are the most accurate diagnostic tests.

In the setting of tissue necrosis, debridement of non-viable tissue (either surgical or in some cases enzymatic) is needed to facilitate wound healing. Antimicrobial wound dressings however do not facilitate tissue debridement.

Vacuum-assisted closure facilitates healing and is often helpful for palliation and comfort.

Diverting colostomy may be needed to prevent fecal contamination of wounds, but would not be the next step before wound debridement, nor before a discussion around goals of care.

Similarly, IV antibiotic therapy for osteomyelitis may be considered when all other risk factors are optimized, but is premature at this time.

18 | CEFAZOLIN FOR MSSA | CHAMBERS

A 52 y/o woman was admitted with a 4 x 5 cm abscess of the right buttock which she says started as a tender bump about a week ago.

She has had subjective fevers beginning the day prior to admission. Vital signs on admission were a temperature of 38.5oC, pulse 100, respiratory rate 16, blood pressure 125/80. Except for the buttock abscess the physical examination was unremarkable including no cardiac murmur, no rash or other skin findings.

Admission chest x-ray was normal.

Complete blood count was normal except for a white blood cell count of 10,500 per mL with 85% neutrophils.

Metabolic panel, serum creatinine, hepatic enzymes, coagulation tests, and urinalysis were all normal.

The abscess was drained and empiric vancomycin was administered on hospital day 1. She has had no further fevers since drainage of the abscess and feels much improved.

Culture of the abscess fluid grew a methicillin-susceptible strain of Staphylococcus aureus (MSSA) and did one of two blood cultures from admission.

Follow-up blood cultures obtained hospital day 2 and day 3 are negative and transthoracic echocardiogram is negative.

On hospital day 5 you are asked to make recommendations for antimicrobial therapy.

Which is your recommendation?

A. No further antimicrobial therapy is needed, since source control has been established
B. Continue vancomycin to complete a 7-day course
C. Continue vancomycin to complete a 14-day course
D. Switch to cefazolin to complete a 7-day course
E. **Switch to cefazolin to complete a 14-day course**

Correct Answer: **Switch to cefazolin to complete a 14-day course**

This is an uncomplicated case of MSSA bacteremia.

The duration of treatment is driven in this case by the presence of bacteremia, not when source control was first established.

A beta-lactam is the drug of choice, not vancomycin, for treatment of MSSA bacteremia.

A large body of observational data suggests that vancomycin is less efficacious (higher mortality, higher rates of treatment failure) than beta-lactams for treatment of MSSA bacteremia.

The recommended duration of therapy for uncomplicated bacteremia is 14 days. Efficacy of shorter courses of therapy even for uncomplicated bacteremia is not well established.

19 | Amp-Ceftriaxone Enterococcus | Chambers

A 72-year-old man with type 2 diabetes mellitus, stage II chronic kidney disease (CKD), and a history of mild aortic stenosis is admitted to the hospital with fever, dysuria, and urinary frequency.

His temperature is 38.90C, pulse regular at 110 beats per minute, and blood pressure 145/95 mm Hg. His lungs are clear; a 3/6 systolic ejection murmur is heard at the right upper sternal boarder.

Laboratory tests are notable for hemoglobin 12 g/dl, white blood cell count 13,500 per mm3 (80% polymorphonuclear cells), serum glucose 340 mg/dl, serum creatinine 1.7 mg/dl, and urinalysis with 3+ protein, 20-50 white cells per high power field, and 4+ glucose.

Two blood cultures and a urine culture are positive for gentamicin-resistant Enterococcus faecalis.

What antimicrobial regimen would you recommend for this patient?

A. Daptomycin
B. Ampicillin
C. **Ampicillin + ceftriaxone**
D. Vancomycin + streptomycin
E. Ampicillin + streptomycin

Correct answer: **Ampicillin + ceftriaxone**

This patient very likely has aortic valve endocarditis, meeting three minor Duke criteria for possible endocarditis: fever; two positive blood cultures for E. faecalis, but with a primary focus, pyelonephritis (hence, this is not a major criterion); and aortic stenosis, a predisposing cardiac condition.

If the patient only has pyelonephritis, then ampicillin alone would be appropriate, but with such a high suspicion for endocarditis, combination therapy should be used.

While daptomycin is active against enterococci, it is not recommended as a single agent for treatment of enterococcal endocarditis.

Resistance to gentamicin and streptomycin are encoded by different genes and a proportion of gentamicin-resistant strains, ~15%, are susceptible to streptomycin. However, this patient has significant renal impairment, which precludes the use of streptomycin because of significant risk of vestibular toxicity, ototoxicity, and nephrotoxicity. Thus, ampicillin + streptomycin is not a preferred regimen.

There is no reason to use vancomycin instead of ampicillin unless the strain is ampicillin-resistant, which most E. faecalis are not and which in any case is not reported for this strain.

Vancomycin-aminoglycoside /streptomycin combinations are also particularly nephrotoxic and to be avoided.

The best choice for this patient is ampicillin-ceftriaxone, which is well tolerated and effective for treatment of E. faecalis endocarditis, including infections caused by gentamicin-resistant strains.

20 | MRSA Endocarditis | Chambers

A 27-year-old man with a history of injection drug use and a prior episode of tricuspid valve endocarditis caused by methicillin-resistant Staphylococcus aureus (MRSA) is admitted with one week of fevers.

A 3/6 systolic murmur is heard at lower left sternal border. Chest x-ray shows multiple peripheral infiltrates bilaterally.

He says that during treatment of the prior endocarditis he had a bad reaction to vancomycin with fevers, a rash all over his body and swelling of his face.

Which of the following would you recommend for initial coverage while awaiting cultures?

A. Dalbavancin
B. **Daptomycin**
C. Linezolid
D. Telavancin
E. Vancomycin

Correct answer: **Daptomycin**

The patient gives a history very suggestive of drug reaction with eosinophilia and systemic symptoms (DRESS), also referred to as drug-induced hypersensitivity syndrome (DIHS) likely due to vancomycin. Vancomycin and its structurally related drugs, dalbavancin and telavancin, should be avoided and rechallenge with these drugs may precipitate a recurrence. In addition, clinical data supporting use of dalbavancin or telavancin for treatment of MRSA endocarditis are limited and these agents are currently not recommended as alternative to vancomycin.

Daptomycin is recommended as an alternative to vancomycin. Although daptomycin is not recommended for treatment of primary pneumonia, it is FDA approved for treatment of right-sided endocarditis, including cases complicated by septic pulmonary embolization, which is what this patient has.

Linezolid would be preferred to daptomycin if this were a primary pneumonia, which is not the case, but because it is a bacteriostatic agent, is not recommended as a first- or second-line agent for treatment of MRSA endocarditis.

21 | Lobar Nephronia | Trautner

A 36-year-old female is 2 years post-cadaveric renal transplantation for renal failure due to chronic glomerulonephritis. She now presents with fever of five days duration. She had some nausea but no urinary, respiratory, or abdominal symptoms. She presented to an outside hospital three days

previously where a chest x-ray, urinalysis and blood culture were negative. She was given levofloxacin but remained febrile with malaise.

Current medications included mycophenolate, sirolimus and prednisone 20 mg.

- Examination found a fever of 39.2°C grade 1 systolic ejection murmur over the left sternal border, and a non-tender transplanted kidney in the right lower quadrant. Renal ultrasound of the transplanted kidney was normal.
- Urine culture grew 100,000 colonies of *E. faecalis*, susceptible to ampicillin.
- Urinalysis found 100 WBC per hpf, nitrate and protein negative.
- WBC was 10,700. Creatinine 1.3 mg/dl

Abdominal CT with contrast showed a lobe of the kidney which did not perfuse well with contrast and was swollen (Fig). There is no evidence of abscess formation.

Ampicillin 2 gm IV q 6h was begun but the patient remained febrile the next 24 hours.

Which of the following is the most appropriate management?

A. CT-guided biopsy of the affected kidney
B. Add gentamicin
C. Wedge resection of affected area of kidney
D. Check urine for "decoy" cells of BK virus
E. **Continue ampicillin at same dose**

Correct Answer: **Continue ampicillin at same dose**

The findings are consistent with "lobar nephronia" or acute focal bacterial nephritis which is usually related to intrarenal or extrarenal obstruction. This form of acute pyelonephritis is characterized by edema and inflammation of one or occasionally 2 kidney lobes. If not treated adequately, the affected lobe can liquefy and form a renal cortical abscess.

Thus, this patient does not currently have an abscess that needs to be drained, but an abscess could ultimately develop.

The modest pyuria and barely elevated WBC likely reflect her immunosuppression.

There is no reason at this point to do a biopsy or a surgical resection. If an abscess were present (this likely would be suggested by the ultrasound which would identify fluid/pus) that would have to be drained.

Response to therapy is usually somewhat slower than pyelonephritis and relapse is probably more common if less than three weeks of treatment are given.

Levofloxacin would not have been a good therapeutic choice. Response of enterococcal pyelonephritis to Levaquin is suboptimal, but may reduce abnormalities of the urinalysis and urine culture.

BK viruria causes renal failure but does not cause fever in renal allograft recipients.

Unlike enterococcal endocarditis, addition of an aminoglycoside is not necessary in treating enterococcal urinary tract infection and is potentially nephrotoxic.

22 | Brodie's Abscess | Nelson

A 17-year-old man from Arizona presents with leg pain. He was in his usual state of good health until 8 months ago when he developed localized pain in his left leg just below the knee.

He denied any antecedent trauma. He also denied any skin lesions, erythema, fevers, chills, sweats, weight loss, or fatigue.

He is a competitive swimmer but he gave up the sport about four months earlier as a result of his leg pain. He denies tobacco, alcohol, or illicit drug use. He has never left Arizona.

He is sexually active with a single female partner.

On examination, his vital signs are normal. The left leg appears normal on visual inspection. Deep palpation below the left knee over his tibia elicits mild discomfort.

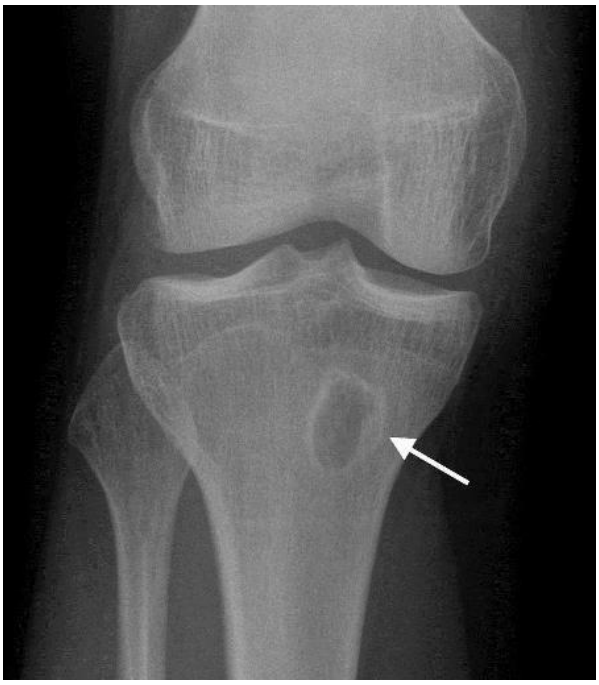
The knee joint is normal. Muscle strength and sensation are normal.

A radiograph of his lower extremity demonstrates a lytic lesion in the proximal tibial metaphysis surrounded by a sclerotic rim (see radiograph below).

MRI demonstrates the "penumbra sign" on T1 weighted imaging (see MRI and bone film below).

Chest x-ray and chest CT are normal.

CT Image



MR Images

Moser et al, Imaging, Volume 93, Issue 5, May 2012, Pages 351-9

Which of the following is most likely to be isolated from a biopsy of this lesion?

A. Histoplasma capsulatum
B. Mycobacterium marinum
C. Pseudomonas aeruginosa
D. **Staphylococcus aureus**

E. Streptococcus pyogenes

Correct answer: **Staphylococcus aureus**

The patient's clinical presentation and radiographs are consistent with the diagnosis of Brodie's abscess.

Brodie's abscess is a subacute or chronic form of osteomyelitis caused by the hematogenous spread (or occasionally direct traumatic inoculation) of an organism to the bony metaphysis of long bones (most often involving the tibia). It occurs more frequently in those under the age of 25 years and in males.

Many patients will only present with localized pain and no systemic symptoms.

Diagnosis is often based on radiographic findings.

The penumbra sign on MR imaging is a thin layer of granulation tissue lining a bone abscess cavity which produces a higher signal on T1-weighted magnetic resonance images; in one study, it had a sensitivity and specificity of 73 and 99 percent, respectively, for the diagnosis of Brodie's abscess.

While Streptococcus and Pseudomonas have been isolated from cultures in persons with Brodie's abscesses, *S. aureus* is the most commonly identified organism.

Up to 50% of cultures from bone biopsies will not yield any pathogen.

M. marinum has not been associated with this clinical presentation.

This patient does not live in an endemic area for histoplasma. Moreover, histoplasma rarely causes bone lesions.

Coccidioidomycosis was not an option, although that fungus is obviously endemic in Arizona. Disseminated coccidioidomycosis can present in exactly this way, though an enhancing rim around the lytic lesion is unusual in coccidioidomycosis and often the chest x-ray shows a chronic infiltrate. Thus, *S. aureus* would still be the most likely answer but cocci would be a possibility, and thus for an exam type question, was not offered as an option.

23 | HYPER C. DIFF | ARONOFF

The hypervirulent strain of *C. difficile* designated North American Pulse Field 1 (NAP1), 027 by PCR ribotyping, and BI by restriction endonuclease analysis (REA) is characterized by which of the following?

A. Patient mortality in excess of 50% within 30 days
B. Recurrent *C. difficile* infection rates of over 35%
C. **High level toxin A and B production**
D. Vancomycin resistance

E. Fidaxomicin resistance

Correct Answer: **High level toxin A and B production**

Hypervirulent strain of *C. difficile* are characterized by mutations in the *tcdC* gene which is a suppressor of toxin A and B production. Thus, with less suppression of toxin, there can be high levels of toxin A and B production.

These strains also typically carry the genes for binary toxin.

These strains have epidemiologic importance although their clinical management (i.e., treatment) does not differ from that of infections with more common strains.

Patient attributable mortality is high but not 50%, mortality is probably less than 7% overall, however, mortality rates in excess of 10% are found in patient populations over the age of 80 years.

Disease occurs primarily in elderly hospitalized patients rather than younger community patients.

24 | H. PYLORI CURE | ARONOFF

A 45-year-old male is diagnosed with *Helicobacter pylori* infection by endoscopy and antral gastric biopsy performed for weight loss and abdominal pain. There is a family history of gastric cancer. He is treated for 14 days with omeprazole, clarithromycin, and amoxicillin.

What would be best option to evaluate this patient regarding *Helicobacter* infection/disease after completing antibiotic therapy?

A. No further testing is necessary for one year
B. **Perform the stool *Helicobacter pylori* antigen test 8 weeks after treatment**
C. Perform the urea breath test 3 weeks after treatment
D. Repeat endoscopy, biopsy, and rapid urease test (RUT) 6 weeks after treatment

Correct answer: **Perform the stool *Helicobacter pylori* antigen test 8 weeks after treatment**

This patient should have test of cure (TOC) for *H. pylori* therapy to confirm eradication of the organism. The *H. pylori* stool antigen test performs with high sensitivity and specificity; is non-invasive; and is FDA-approved for TOC, making this the optimal approach.

The test should be performed at least 4 weeks after completion of antibiotic and at least 4 weeks of PPI therapy to avoid false negatives.

Both the urea breath test and endoscopy with rapid urease testing are acceptable alternatives. However, the urea breath test is dependent on live organisms. Three weeks after treatment is too soon to repeat this test as a false negative result may occur.

Given the recent endoscopy and biopsies, it is not necessary to again perform endoscopy to evaluate for gastric cancer, and it is not necessary to perform an invasive test to confirm cure of H. pylori infection.

25 | FLU RX | PAVIA

A 72 y/o retired fireman who has a history of chronic obstructive lung disease is seen in the emergency department because of 96 hours of cough, chills, sore throat, and body aches. He lives in an assisted care facility where he has his own room but takes meals in a congregate dining room.

He reports that a number of other residents and servers in the dining room have been coughing. In the emergency room a rapid test for influenza is positive. He is hypoxemic and admitted to the intensive care unit.

Regarding treatment for influenza, he should receive:

A. No specific anti-viral because the patient has been ill for substantially more than 48 hours
B. Zanamivir
C. Zanamivir and Oseltamivir
D. **Oseltamivir**
E. Rimantadine

Correct answer: **Oseltamivir**

Although 48 hours is used as a symptom interval beyond which specific anti-viral treatment is not recommended for out-patients, this interval is waived for patients who are sick enough to warrant ICU care. So, this patient should be treated.

Zanamivir is given by inhalation and would be difficult to administer in this hypoxemic, acutely ill patient with lung disease. Rimantadine (and amantadine) are active only against influenza A for which there is enough resistance that neither drug should be used in the US for influenza treatment or prophylaxis.

Alternative correct answers could be peramivir, which is given intravenously and might be preferred in this setting if available, or the new single-dose oral agent, baloxavir, but for which experience in ill hospitalized patients is still limited.

CDC statements are extremely helpful, but do not always guide practice: however, in terms of the "correct" answer for an exam, keep in mind this 2019 CDC communication: "Oral or enterically-administered oseltamivir is the only recommended antiviral medication for treatment of hospitalized patients with suspected or confirmed influenza and patients with severe or complicated illness with suspected or confirmed influenza (e.g., pneumonia, exacerbation of underlying chronic medical condition) who are not hospitalized. There are insufficient data for inhaled zanamivir, intravenous peramivir, and oral baloxavir in patients with severe influenza disease."

26 | PJI Dx | Nelson

A 65-year-old man 6 weeks post right total knee arthroplasty presents with pain and swelling of the right knee that started two weeks ago.

He has no fever.

Physical examination shows a well-healed wound, surrounded by erythema and some bogginess over the right knee.

Which of the following is the next best step?

A. Measurement of C-reactive protein
B. Knee aspiration for alpha defensin testing
C. **Knee aspiration for cell count and differential and bacterial culture**
D. Knee aspiration for 16S ribosomal RNA gene PCR and sequencing

Correct answer: **Knee aspiration for cell count and differential and bacterial culture**

This patient has possible prosthetic joint infection. Synovial fluid aspiration for white cell count and differential and inoculation into blood culture bottles for aerobic and anaerobic bacterial cultures should be performed.

Alpha defensin testing could be considered but would not provide much information beyond that provided by the synovial fluid white cell count and differential. Alpha defensin is an antimicrobial peptide that is secreted by human neutrophils in response to pathogenic presence. It then integrates into the pathogen's cell membrane and causes rapid killing of the pathogen, thus providing antimicrobial support to the immune system. This biomarker has been advocated as being sensitive and specific for prosthetic joint infections. Culture (aerobic and anaerobic) is needed to try to identify the infecting microorganism(s) if the joint is infected. C-reactive protein and erythrocyte sedimentation rate could be considered but are not the preferred next step.

16S ribosomal RNA gene PCR and sequencing could be helpful but not as a first step (i.e., only if cultures are negative).

27 | Penicillin Rash | Nelson

A 36-year-old male with HIV infection and ocular syphilis has a history of penicillin allergy. He reports a serious rash that occurred when he was treated with penicillin for a dental infection. He was told never to take penicillin again and is confident that he has not taken penicillin or any related drug since.

Which feature of the rash would exclude the use of penicillin for his ocular syphilis?

A. Immediate onset of rash within 24 hours
B. Need for antihistamine therapy

C. Associated fever with the rash
D. **Blistering or mucous membrane involvement**
E. Prolonged time (7 days) to resolution of rash

Correct answer: **Blistering or mucous membrane involvement**

It is important to take a detailed history around prior allergy to penicillin to determine whether penicillin can be administered safely, and whether skin testing and/or test dosing is needed prior to systemic use.

Immediate cutaneous reactions are usually urticarial and are mediated by IgE. These reactions are potentially serious, but are amenable to penicillin skin testing. A history of an immediate reaction to penicillin should prompt skin testing prior to administration. In the setting of a positive skin test, desensitization can still be employed if penicillin is essential for treatment.

Severe cutaneous adverse reactions (SCAR), such as DRESS syndrome (drug reaction with eosinophilia and systemic symptoms), Stevens-Johnson syndrome or toxic-epidermal necrolysis may recur upon rechallenge and are associated with significant morbidity and mortality. Beta-lactam therapy should be avoided if there is a history of a SCAR to a penicillin. A history of a rash with blistering or mucous membrane involvement is suggestive of these diagnoses.

The need for antihistamine therapy does not inform rash type or safety of penicillin use. Similarly, some minor delayed hypersensitivity reactions may take more than a few days to remit, but this alone would not preclude later use of a penicillin. While drug fever can be seen with penicillin, penicillin is often used to treat infections associated with fever; in and of itself this is not an exclusion to later use of penicillin in the absence of organ toxicity or severe cutaneous adverse reaction.

28 | Recurrent UTI | Trautner

A 22-year-old female has had frequent episodes of lower urinary tract infections. She has frequent intercourse with a single partner, who always uses condoms with spermicide.

Which one of the following actions would be most likely to decrease the frequency of her infections?

A. **Have her partner discontinue spermicide use with condoms**
B. Vaginal douching after intercourse
C. Discontinue wearing of pantyhose
D. Urinate after intercourse
E. Drink cranberry juice for prophylaxis

Correct answer: **Have her partner discontinue spermicide use with condoms**

Spermicide use, whether with condoms or diaphragms, has been shown to increase the risk of UTIs from E. coli and Staphylococcus saprophyticus 2-3 fold.

Cranberry juice has been shown to be ineffective in preventing recurrent UTIs in a recent well-controlled randomized trial.

Pantyhose, urinating after intercourse, douching, and wiping patterns have been shown to have nothing to do with frequency of UTIs.

29 | Brucella | Aronoff

A 22-year-old previously healthy male from El Paso, Texas, who presented to the Emergency Room with a 3-month history of lower back pain elicited after lifting weights at the gym. He also reported intermittent fevers and chills as well as a 20-pound unintentional weight loss.

He denied any recent travel and worked as a correctional officer. On physical exam he had normal vital signs, no spinal or paraspinal tenderness, and no neurologic deficits.

An MRI was notable for findings concerning for discitis/osteomyelitis of L5/S1 with abscess formation, so the patient was admitted and subsequent interventional radiology-guided biopsies were performed twice, and cultures and pathology were negative for bacteria, fungi, and acid-fast bacilli.

He was discharged on vancomycin, ceftriaxone, and doxycycline for the treatment of osteomyelitis of unknown origin.

On follow-up it was discovered that he regularly consumed fresh cheese from Mexico (*queso fresco*) and occasionally ate sushi from a local restaurant. He had remained symptomatic with fevers.

Which of the following infections does this likely represent?

A. *Francisella tularensis*
B. *Nocardia brasiliensis*
C. ***Brucella melitensis***
D. *Actinomyces israelii*
E. *Shigella boydii*

Correct Answer: ***Brucella melitensis***

The only two agents in the list that are likely to cause vertebral osteomyelitis are Brucella and Actinomyces. Both can be grown on culture but are easy to miss on routine culture. Exposure to unpasteurized milk points towards brucellosis. Serology for brucellosis can be helpful in cases like this. Brucellosis is an endemic zoonotic disease that causes up to ~500 000 cases globally but is rare in the US because of an extensive and ongoing eradication program. There are only 100–200 cases reported annually here, and most are caused by *B. melitensis*. Brucellosis is common in many other countries, including Mexico. Although pasteurization eradicates Brucella, soft cheeses in many countries outside with USA are not made with pasteurized milk.

Treatment of this patient with doxycycline alone would not be adequate. Combination of doxycycline with streptomycin or rifampin would be indicated. Ceftriaxone and vancomycin have no activity in brucellosis.

The primary mode of transmission to humans in the USA is in unpasteurized dairy products.

Brucellosis is also an occupational disease in shepherds, abattoir workers, veterinarians, dairy-industry professionals, and laboratory personnel (including laboratory workers handling Brucella cultures and workers preparing brucellosis vaccines for animal use).

Features of this case were obtained from Krause C, *et al., J Surg Case Rep*. 2021 Feb 13;2021(2):rjaa577. doi: 10.1093/jscr/rjaa577.

30 | HEV | PAVIA

A 42-year-old man is referred for asymptomatic elevation of his liver function tests.

He underwent a living-related donor kidney transplantation 14 months earlier secondary to end-stage renal disease from uncontrolled hypertension (CMV D^-/R^-).

Six months after his transplant, his physicians noted an asymptomatic increase in aminotransferases, with aspartate aminotransferase (AST) 8 times the upper limit of normal (ULN), alanine aminotransferase (ALT) 6 x ULN, and gamma glutamyl transferase (GGT) 5 x ULN.

His total bilirubin was mildly elevated and his alkaline phosphatase was normal.

The following were serologies were negative:

- Hepatitis A virus
- Hepatitis B virus (HBV) surface antigen
- hepatitis C virus (HCV)
- human immunodeficiency virus (HIV)- 1,2
- Epstein-Barr virus VCA IgM
- herpes simplex virus 1 and 2 IgG
- cytomegalovirus IgG

Also negative or normal were:

- HBV DNA and HCV RNA were undetectable.
- Liver autoimmunity panel was negative.

- Abdominal ultrasound was normal.

He denied alcohol consumption. He recently returned from living the past year in Germany and is an avid consumer of sausage.

His immunosuppressive regimen included tacrolimus, mycophenolate mofetil, and prednisolone.

His liver function tests have continued to be elevated over the past 9 months despite changes in his immunosuppressive regimen and antihypertensive medications.

His physical examination was unremarkable.

His BMI was 20 kg/m^2. No scleral icterus was noted and no stigmata of cirrhosis were noted.

A liver biopsy demonstrated lobular hepatitis without fibrosis.

Which of the following entities is most likely responsible for his hepatitis?

A. Coxiella burnetii
B. Hepatitis D
C. **Hepatitis E**
D. Leptospira interrogans
E. Non-alcoholic hepatosteatosis

Correct Answer: **Hepatitis E**

The most likely etiology for his persistently elevated liver function tests is chronic hepatitis E infection.

There are multiple HEV genotypes that vary regionally and with regard to their zoonotic reservoirs.

Genotype 3 hepatitis E virus largely has been observed in Europe, where it is endemic in swine. Although illness is self-limited in previously health patients, some immunosuppressed patients, largely solid organ transplants to date, have become chronically infected and develop persistent hepatic function abnormalities and viremia. Cirrhosis can occur.

Oral ribavirin has been reported to reduce viremia. Eating undercooked pork has been identified as a risk factor for infection by genotype 3 HEV.

Genotypes 1 and 2 HEV are reported from Southeast Asia. Fatal infections have been reported in pregnant women.

The patient is not infected with Hepatitis B so cannot be infected with Hepatitis D.

While Coxiella may cause hepatitis, the patient has no other manifestations of Q fever and the liver biopsy did not reveal any granulomas.

He has no other manifestations to suggest Weil's disease due to Leptospira.

The biopsy did not reveal evidence of hepatic steatosis.