From Lima to Bakersfield

IDAC Spring Symposium 3/5/2022

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Story

CC: B/L LE pain x3 weeks

HPI:

- 50-year-old Peruvian male with multiple painful nodules located on B/L LE
- 10/10 in severity
- No trauma or inciting events
- Requiring wheelchair x4 days
- No associated fevers or rigors
- Remainder of ROS negative

Past History

MEDICAL HISTORY

- Appendicitis

SURGICAL HISTORY

- Appendectomy

FAMILY HISTORY

- Denies

ALLERGIES

- NKDA

HOME MEDICATIONS

- None

Social History

SUBSTANCE USE

- Alcohol: 1 drink / 6 months
- Tobacco: Few cigarettes >20 years ago
- Drugs/IDU: Denies

RESIDENCE/TRAVEL

- Birth - 11/2020: Lima, Peru
- 11/2020 - 1/2021: Mexico
- 1/2021 - 2/2021: Mcallen, Tx
- 2/2021 - Present: Bakersfield, CA

OCCUPATION

- Taxi driver
- Residential landscaper
- Field worker

CHEMICAL EXPOSURE

- Possible pesticide exposure

ANIMAL EXSPOSURE

- Dog and hamster (Peru)
- Dog and goat on property (Bakersfield)

Social History

Hobbies

- Soccer (Played on concrete)
- Swimming and fishing in a Lake

Sexual History

- Last unprotected intercourse with female partner in 2020
- No reported STIs

Antibiotic History

- 1 course of Amoxicillin for otitis media in 2020

DENIES

- Known sick contacts
- Unpasteurized dairy products
- homelessness
- Recent hospitalizations

Physical Exam

Temp: 37.0C

SKIN/EXT: 2 warm and tender 4 cm nodular lesions with overlying erythema and underlying fluctuance located on the L anterolateral thigh and R lateral LE.

Labs

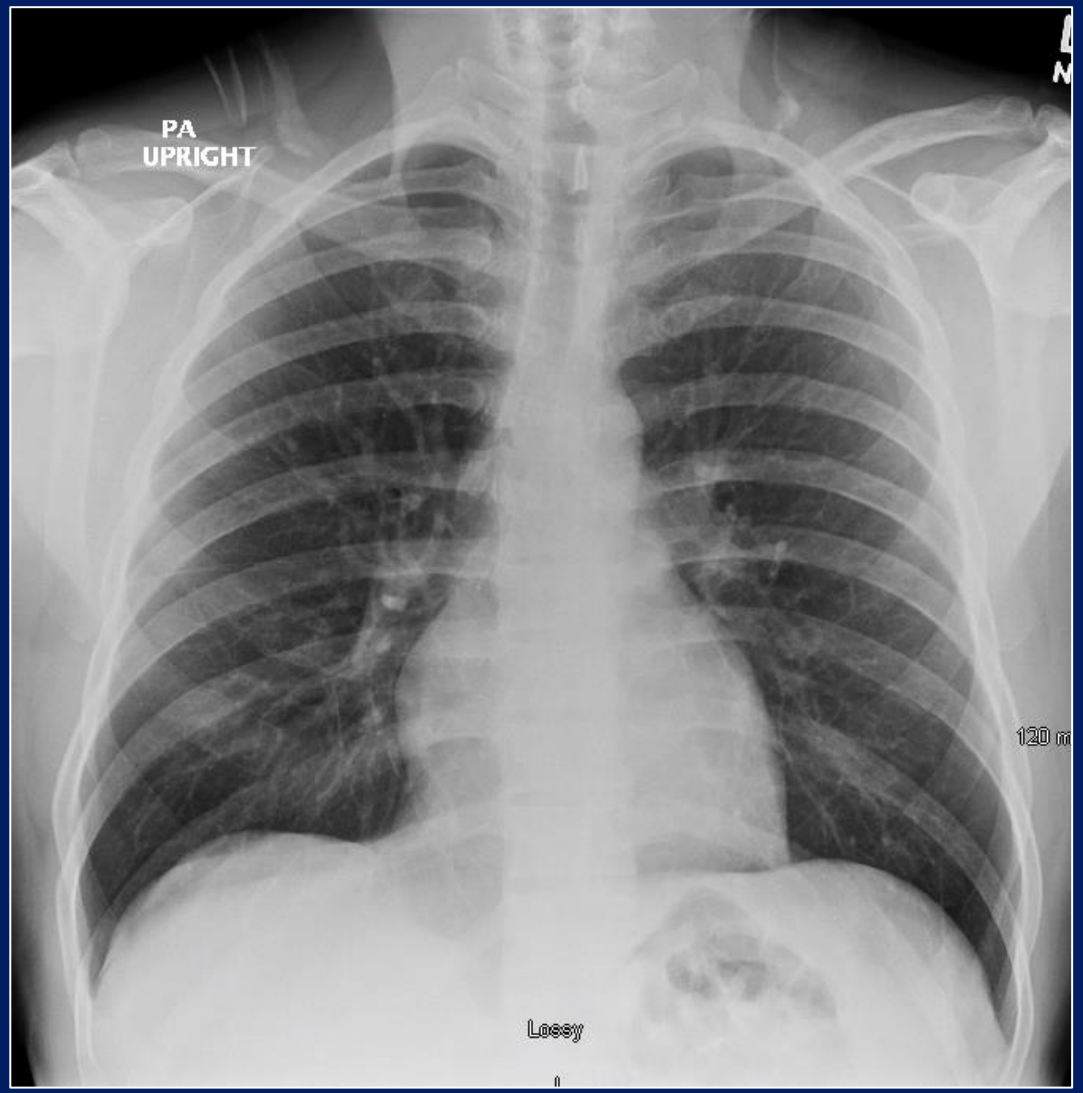
CBC diff
2.6 / 11.0 / 33.8 / 282
MCV 90.6
ANC 2.0
ALC 0.5

BMP
136 / 4.5 / 103 / 27 / 18 / 0.82 / 114

LFT
AST 77 / ALT 184 / ALP 523
T bili 0.6 / T protein 7.5 / **Alb 2.6**

Lactic Acid: 1.2
Procalcitonin: <0.10
CRP 5.99
ESR: >100
CK: 70
HbA1c: 6.0%
Acute Hep Panel: Nonreactive
HIV Ag/Ab Screen: Nonreactive

Chest Radiograph



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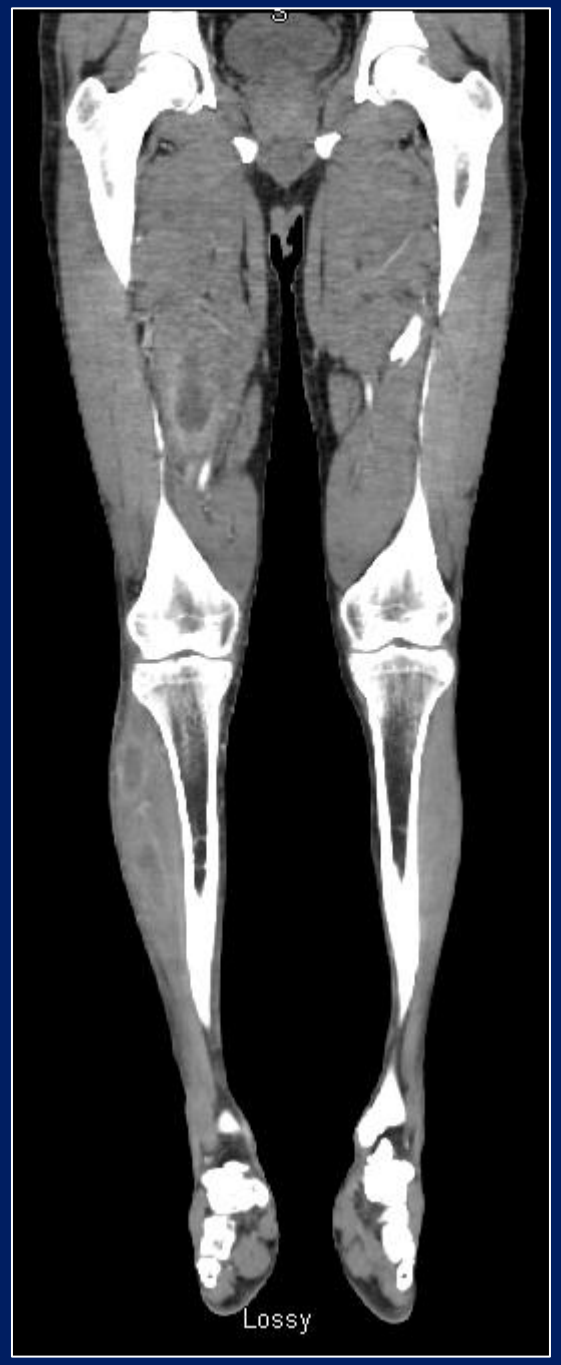
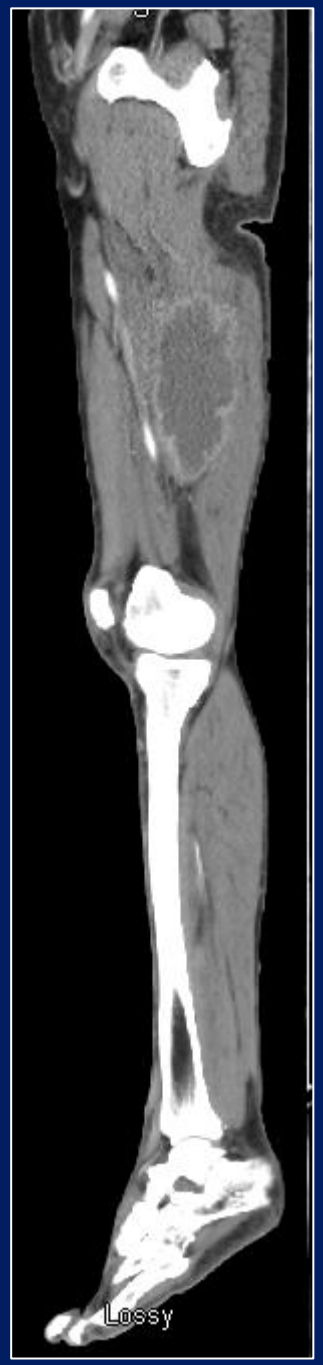
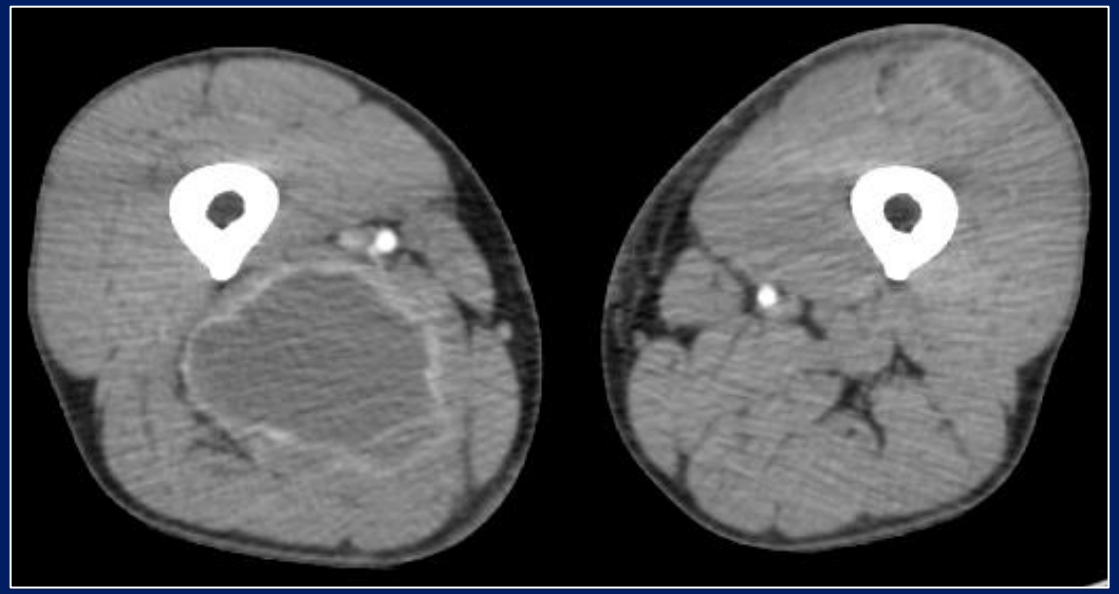
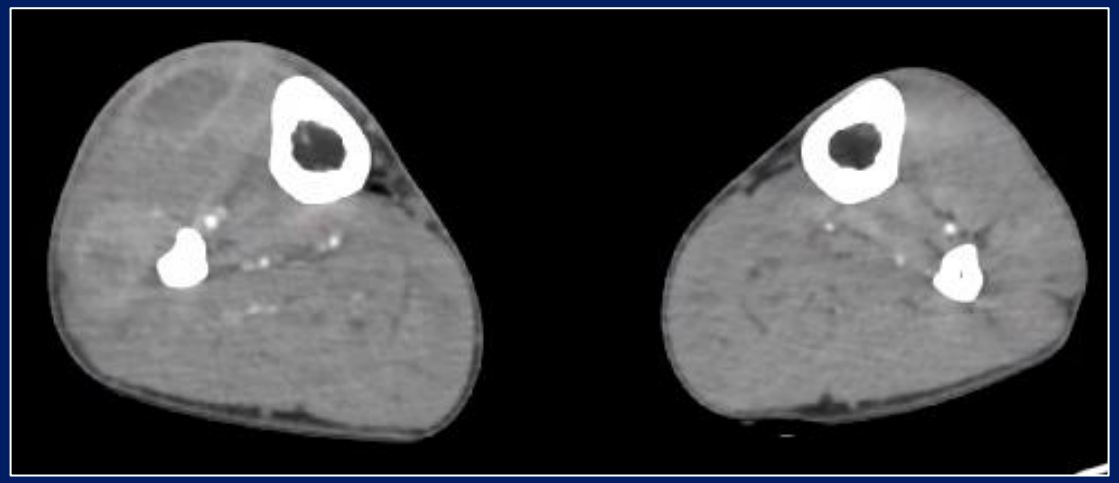
B/L LE CT with Contrast









Hospital Course

B/L LE abscesses

- Blood Culture x2
- Vancomycin + PIP/TAZ
- General Surgery consultation

Hospital Course – Day 2

GENERAL SURGERY

- I & D left anterior thigh abscess
- I & D right lower leg abscess

INTERVENTIONAL RADIOLOGY

- Percutaneous drainage of right posterior thigh abscess
- 400 ml removed
- Hemovac drain left in place

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Differentials?

Additional Results

SARS-CoV-2 RNA

Reactive

Cocci Serology

IgM immunodiffusion NR

IgG immunodiffusion NR

CF titer <1:2

QuantiFERON TB Gold

Negative

Blood Culture x2

Staphylococcus epidermidis

Staphylococcus hominis

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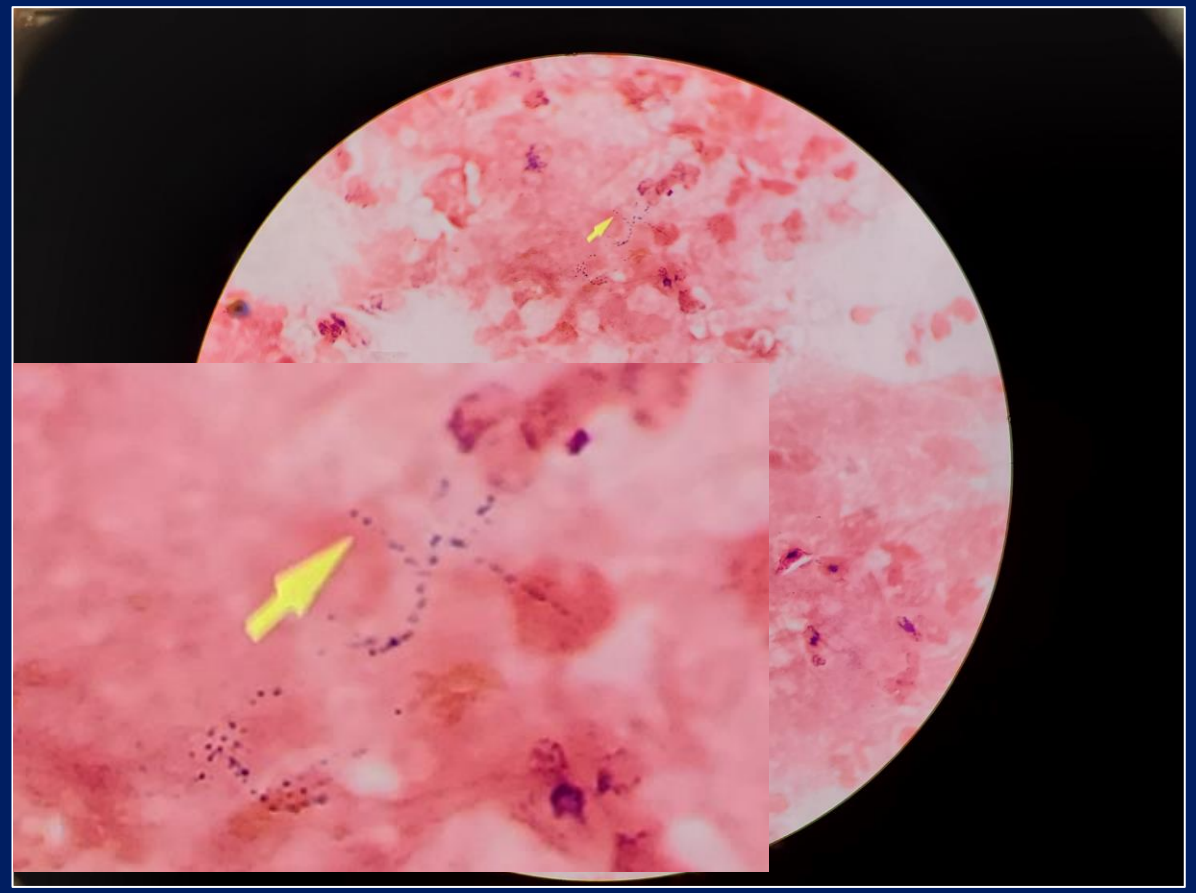
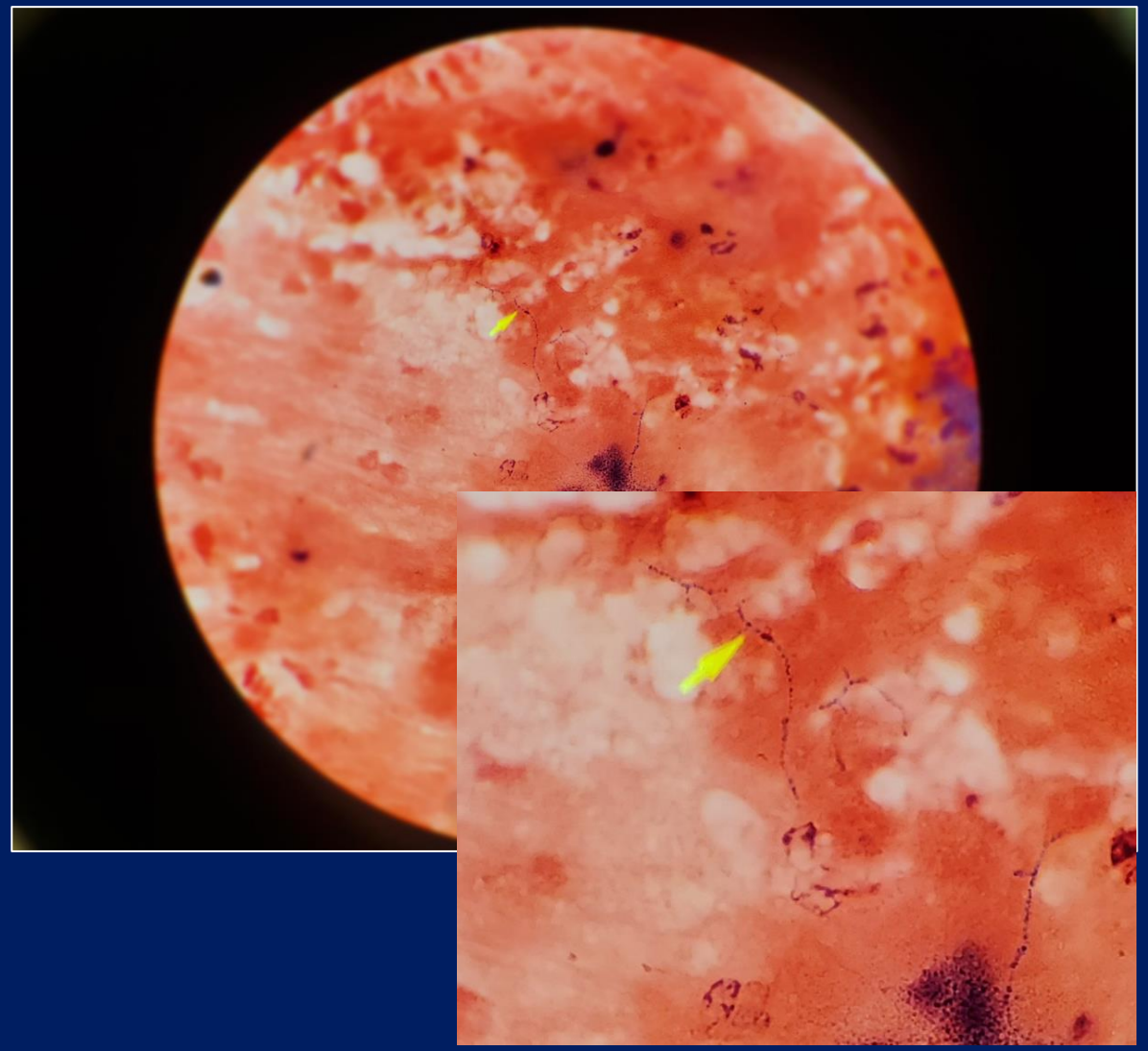
Microbiology – R Lower Leg Abscess





- Gram variable rods
- Gram variable filamentous rods

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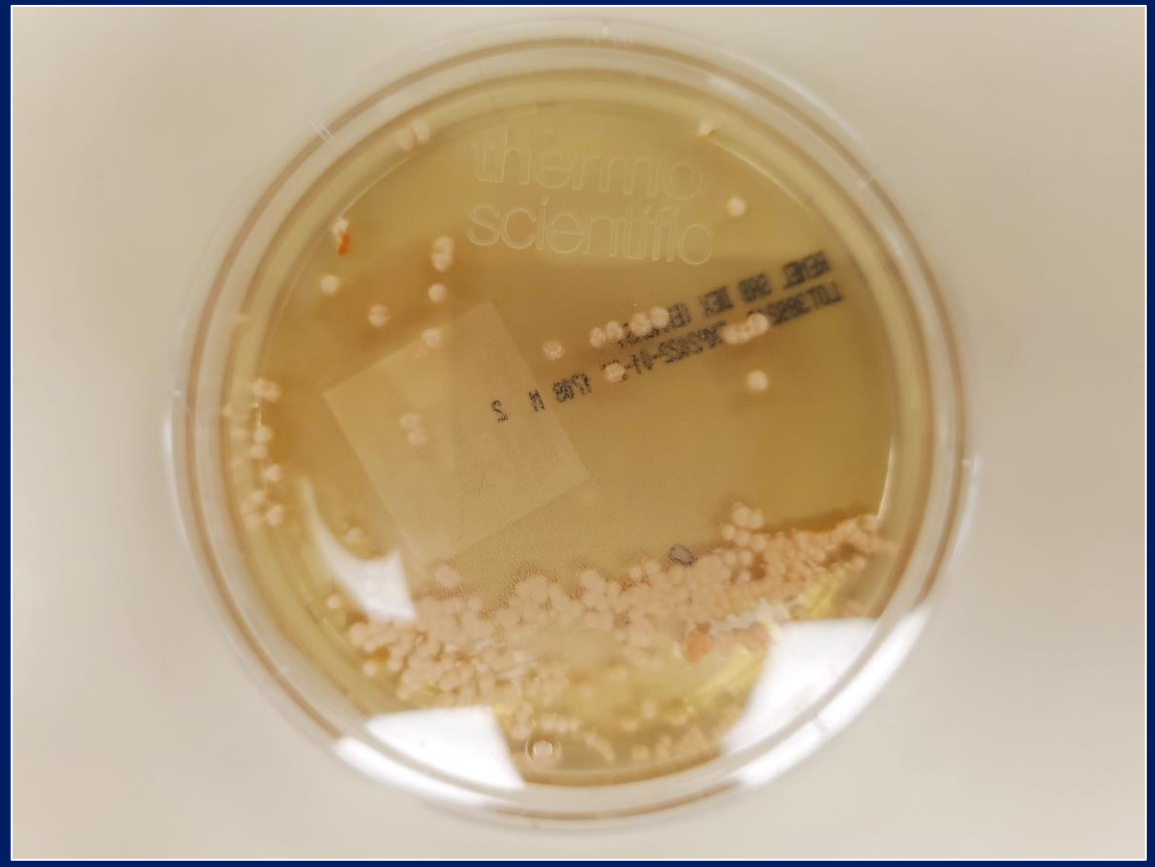
Microbiology – R Lower Leg Abscess



- Sabouraud Dextrose Agar

- Blood Agar

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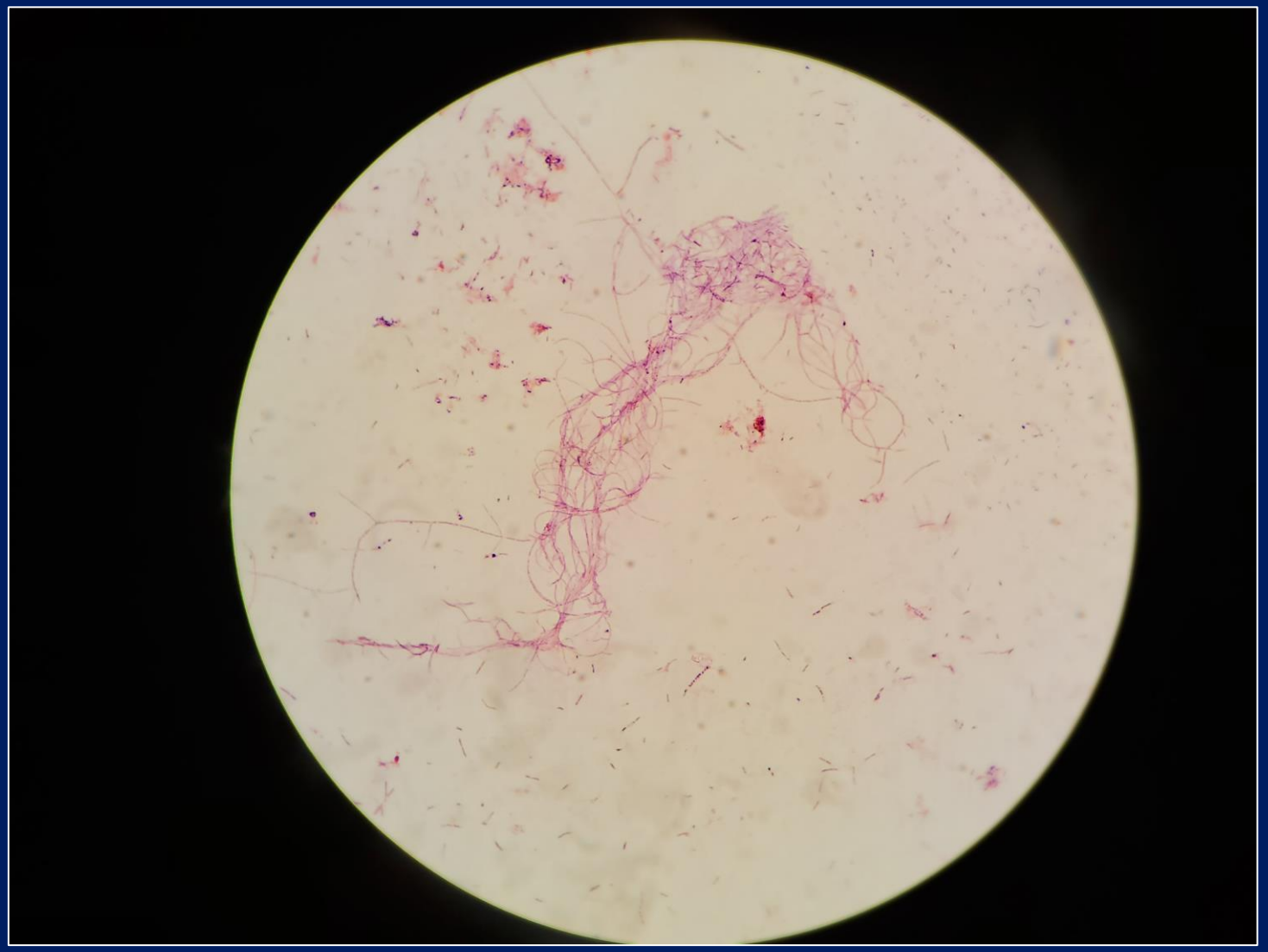
Microbiology – R Lower Leg Abscess



- Acid Fast Stain
- Partially Acid Fast

Hospital Course

Multiple B/L LE abscesses, DDx: Disseminated Nocardiosis

- Bactrim DS 2 TAB PO BID
- Meropenem 2 g IV Q8H
- Isolate sent out for speciation and sensitivity testing
- TTE to evaluate for vegetations and/or abscess
- CT C/A/P to evaluate for malignancy
- Immunodeficiency work-up

Hospital Course

Repeat Blood Cx x2

No growth

TTE

No vegetations

CT C/A/P

Splenomegaly

Hepatic Steatosis

No evidence of malignancy

IgE 62, IgA 226, IgG 1259, IgM 120

ANA: Negative

C3: 130

C4: 32

CH50 Total: 260

Neutrophil Oxidative Burst: >94%

CD4 Count: 492 (39%)

CD8 Count: 354 (28%)

Hospital Course

Required 2 additional I & D by general surgery

PRELIMINARY SPECIATION

- *Nocardia brasiliensis*

PLAN

- Discharge with:
  - Bactrim DS 2 TAB BID
  - Linezolid 600 mg PO BID
  - Duration 6-12 months

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Nocardia brasiliensis Sensitivities

	MIC	
Amikacin	<=1	S
Amox/Clav	8 / 4	S
Ceftriaxone	32	I
Cefepime	>32	R
Ciprofloxacin	>4	R
Clarithromycin	>16	R
Doxycycline	4	I

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Nocardia brasiliensis Sensitivities

	MIC	
Imipenem	>64	R
Linezolid	2	S
Minocycline	4	I
Moxifloxacin	2	I
Tigecycline	0.5	I
Tobramycin	<=1	S
TMP/SMX	0.5 / 9.5	S

Outpatient Clinic

- DC Linezolid
- Continue Bactrim DS 2 TAB PO BID x6-12 months

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Nocardiosis

- Infection with aerobic actinomycetes (Genus: Nocardia)
- Partially acid-fast gram-positive branching filamentous rods
- Over 90 species; 54 known to cause disease in humans
- Of 765 isolates sent to CDC (1995-2004): *14% N. brasiliensis*
- Manifestations: Pulmonary, cutaneous, lympho-cutaneous, CNS
- Disseminated: 2 non-contiguous sites of infection
- Impaired cell mediated immunity may contribute to dissemination
- Often requires prolonged treatment course of 6-12 months

Risk Factors

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TABLE 2 | PIDs that can cause nocardiosis.

Disease	Immunological consequences
CGD	Defects in the NADPH oxidase complex that impairs the capacity of phagocytes to produce reactive oxygen species.
Hypogammaglobulinemia	Reduction in the titers of circulating antibodies.
CVID	Deficient levels of IgG, IgA, and IgM*.
Hyper IgE syndrome	Elevated serum IgE level, chronic dermatitis, intense pruritus, and severe recurrent infection.
Idiopathic $CD4^+$ T-lymphocytopenia	Low levels of $CD4^+$ T cells.
SCID	Lack of B and T cells.
MSMD	IL-12 and IL-23 abolishment**.
Anti-GM-CSF autoantibodies	Blockade of GM-CSF.

**CVID is a heterogeneous group of diseases that can present with multiple different immunological abnormalities. The immunological consequences shown here are the ones observed in the patient reported in Singh et al. (18).*

***The genetic causes of MSMD can impair multiple branches of IFN-γ-mediated immunity. The genetic etiologies of MSMD that sometimes curse with nocardiosis impair IL-12 and IL-23 signaling.*

TABLE 1 | Some risk factors for nocardiosis.

Diseases
AIDS
Solid-organ transplant
Chronic obstructive pulmonary disease
Chronic kidney disease
Cushing's syndrome
Pulmonary fibrosis
Diabetes mellitus
Systemic Lupus erythematosus
Hematopoietic stem cell transplantation
Drug abuse
Malignancies
End-stage renal disease
Membranoproliferative glomerulonephritis
Lung sarcoidosis
Pulmonary proteinosis
Alcoholism long history of smoking

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Nocardia brasiliensis

- Dermatologic manifestations of *N. brasiliensis*: Subcutaneous nodules, abscesses, or panniculitis.
- Mycetoma: Most commonly caused by *N. brasiliensis*.
- Surgical debridement is often required

Susceptibility

- Antibiotic susceptibilities vary greatly amongst species
- Discrepancies amongst labs has been well documented

General antimicrobial susceptibility patterns for the most common *Nocardia* species

	N. farcinica	*N. nova*	*N. brasiliensis*	*N. cyriacigeorgica*	*N. abscessus*	*N. otitidiscaviarum*
Trimethoprim-sulfamethoxazole	S	S	S	S	S	S
Imipenem	S	S	R	S	S	R
Amikacin	S	S	S	S	S	S
Linezolid	S	S	S	S	S	S
Tobramycin	R	R	S	S	S	S
Amoxicillin-clavulanate	S	R	S	R	S	R
Ceftriaxone	R	S	R	S	S	R
Ciprofloxacin	R	R	R	R	R	R
Clarithromycin	R	S	R	R	R	R
Doxycycline	R	R	R	R	S	R
Minocycline	R	R	R	R	S	R
Erythromycin	R	S	R	R	R	R

Empiric Treatment

Mild Pulmonary Infection w/o dissemination

- Monotherapy with TMP-SMX

Immunocompromised Host, Severe Pulmonary Infection, >1 site of Infection (Not CNS), or isolated CNS Disease

- At least 2 drug regimen with Amikacin + Imipenem/Meropenem or TMP/SMX

>1 site of infection involving CNS or Life-threatening Infection

- 3 drug regimen with TMP/SMX + Imipenem/Meropenem + Amikacin or Ceftriaxone or Linezolid

Conclusion

- For patients with disseminated infection or intolerance to TMP/SMX, isolates should be sent to a specialized reference lab for susceptibility testing and empiric therapy with 2 or 3 drug regimens should be continued in the interim.

Update

- ANC decreased to 400 but has since improved to 800 after discontinuation of Linezolid
- Absolute Lymphocytes: 896
- CD19 B Cells: 44 (5%)
- CD3 T Cells: 609 (68%)

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