

History

HPI:

- 7 month old Caucasian female born to non-consanguinous parents
- 3 days of low-grade fever (Tmax 38.0°C) and rhinorrhea
- Tachypnea and perioral cyanosis noted by mother on the day of presentation.

PMHx:

- Hospitalized at 5 months of age for 14 days due to tachypnea with brief intensive care unit stay for high flow nasal cannula
- Chest X-ray with multifocal airspace opacities and respiratory viral panel PCR from nasopharyngeal specimen with Coronavirus
- Post-discharge follow up: no tachypnea and O₂ sat 100% on room air.

Other History:

- Immunizations up to date; No medications; Social history unremarkable
- FHx: No history of recurrent infections, recurrent fevers, immunodeficiency, autoimmunity, or autoinflammation

Physical Exam and Initial Studies

Exam:

- T – 38.2° C, RR – 73, HR - 158, BP – 100/65, O2 sat (ra) – 84%
- Wt 7.7kg (45th%); Lt 67.5cm (25th%)
- Awake, interactive, smiling, normal facies
- Tachypneic with subcostal retractions but clear breath sounds.
- No lymphadenopathy, hepatosplenomegaly, or rash

Initial studies:

- Normal chemistries
- White blood cell count (WBC) 12.9×10^3 cells/ μ L
 - ANC 7240 cells/ μ L; ALC 4790 cells/ μ L; AMC 620 cells/ μ L; AEC 210 cells/ μ L
 - Hemoglobin 11.0 g/dL; Platelets 468×10^3 cells/ μ L
- Chest X-ray: Left lower lobe consolidation, bilateral interstitial opacities, peribronchial thickening, and mild hyperinflation
- npRVP (PCR) -- Coronavirus positive

Hospital Course:

- Started on ceftriaxone for potential community acquired pneumonia
- Transferred to the ICU on HD#8 due to increasing oxygen requirement.
- ID consult requested due to detection of Coronavirus.

Questions?

Next Steps?

Initial Immunologic Evaluation

Quantitative serum immunoglobulins

- IgG <61 mg/dL
- IgM - 75 mg/dL
- IgE <1mg/dL
- IgA <5 mg/dL

Negative diphtheria, tetanus, and pneumococcal titers

Peripheral blood flow cytometry

- WBC 9.3×10^3 cells/ μ L, ALC 3830 cells/ μ L
- CD3+ T cells, 1337/ μ L
- CD4+ T cells, 267/ μ L
- CD8+ T cells, 1031/ μ L
- CD19+ cells, 2254/ μ L
- CD56/16+ cells, 153/ μ L

HIV antibody negative

Questions?

Next Steps?

Further Evaluation

ID

- BAL silver Silver stain positive for *Pneumocystis jirovecii*
- Coronavirus PCR positive
- CMV and Histoplasma negative from blood and BAL

Immunology

- Lymphocyte Mitogen/Antigen Stimulation and Proliferation
 - absent response to Candida and Tetanus
 - normal PHA, low-normal ConA, and normal Pokeweed mitogen responses
 - significantly decreased following stimulation with α CD3 and following α CD3+ α CD28 stimulation
 - normal proliferation following stimulation with α CD3 + IL-2
- Slight increase in CD45RO+CD4+ T cells for age (120 cells/ μ L)
- Thymic output
 - low CD4+ T cell TREC positive cells (286 cells/ μ L)
 - normal total CD3+ and CD8+ TREC positive T cells as well as normal TREC copies per 10^6 CD3+ T cells
 - low frequency and absolute number of CD31+CD4+ T cells

Further Immunologic Evaluation

Other studies

- CD127/CD132 expression on CD3+ T cells; CD40 expression on CD19+ B cells
- No maternal origin CD3+ T cells
- STAT5 phosphorylation in CD4+ T cells was low (7%, nml 10-47%)

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- MHC expression on peripheral blood lymphocytes and monocytes was measured and revealed low expression of class II (HLA-DR) expression
 - Sequencing of the *RFY* and *STAT5* genes revealed no mutations.
 - *CIITA* sequencing revealed heterozygosity for two novel mutations, one likely pathogenic
 - Diagnosis: Balo's syndrome, type II, complementation group 1

Warning!
Diagnosis
Approaching