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TEACHING FILES (GRAND ROUNDS)

LUDWIG'S ANGINA WITH INTERNAL JUGULAR VEIN THROMBOSIS - HOW TO MANAGE?

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Clinical Problem:

An 8-year-old boy presented in September 2024 with intermittent fever, right-sided neck swelling near jaw, difficulty in swallowing and opening the mouth 5 days after a dental procedure. He was diagnosed in January 2024 with a type II Abernathy malformation and an intrapulmonary shunt with situs solitus. On presentation, weight was 20 kg (10^{th}-25^{th} percentile according to Indian Academy of Pediatrics (IAP) growth charts) and height was 120 cm (10^{th}-25^{th} percentile according to IAP growth charts). On examination, he had painful neck movements, trismus (1.5-finger mouth opening) and pus was visualised in the oral cavity draining near the left lower molar. There was a right-sided firm, non-tender swelling in the submandibular region. Other general and systemic examinations were normal. Investigations of the patient are shown in Table 1. Computerized tomography (CT) of the neck showed a deep neck space collection extending into the right carotid and retromandibular spaces with no skull-base or mediastinal extension. Head and neck ultrasound showed diffuse inflammatory changes in the right face, right-sided prevertebral collection, bilateral submandibular collection, and a right internal jugular vein (IJV) partial thrombus. Abdominal ultrasound showed a liver hematoma and aneurysmal dilatation of the portal vein at the porta hepatis. Intraoral pus swab from the gingivolingual sulcus near the left lower molar grew pansensitive *Candida albicans* and *Streptococcus mitis*. He underwent an incision and drainage of the swelling through an intraoral approach and removal of the infected left lower molar, right lower molar and left lower canine. Pus aspirated from the swelling did not grow any organism. He was given intravenous (IV) vancomycin, ceftriaxone, metronidazole and chlorhexidine mouthwash for 5 days. However, he developed persistent fever spikes and right facial swelling. He underwent an incision and drainage of the facial swelling. Pus culture did not show any growth. In view of clinical suspicion of Ludwig's angina with Lemierre syndrome, antibiotics were changed to IV penicillin G (50,000U/kg/dose every 4-hours) and IV clindamycin (40 mg/kg/day every 6-hours) for 2 weeks followed by 2 weeks of oral penicillin and oral clindamycin. For the IJV thrombus, he was not started with any anticoagulation as his clotting parameters were deranged (Table 1). He was discharged on day 17 of admission. On follow-up 2-weeks later, pain, and fever had subsided and the facial wound had healed. Subsequently, oral penicillin was not available and he received amoxicillin-clavulanate and clindamycin for 4 weeks and was asked to follow-up in the outpatient department. He was referred to the liver clinic for his Abernathy malformation.

How to manage Ludwig's angina and internal jugular vein thrombosis?

Discussion:

Ludwig's angina is a severe, rapidly progressive cellulitis of the neck and floor of the mouth, typically caused by dental or oropharyngeal infections. This infection can spread quickly, leading to airway obstruction, sepsis, and even death. The infection often extends to the surrounding structures, including the IJV.[1] When this occurs, it can result in Lemierre syndrome, a rare but serious complication that involves septic thrombophlebitis of the IJV, which can lead to septic emboli and the spread of infection to distant organs, including the lungs and brain.[2] The pathogens that cause Ludwig's angina and Lemierre syndrome are often similar, with Fusobacterium necrophorum, Streptococcus, Enterococcus, and Bacteroides species playing key roles in the infection.[1,2] Imaging plays a crucial role in diagnosing and monitoring these conditions. Techniques such as ultrasound, CT with contrast, and magnetic resonance imaging (with venography for detecting thrombosis) are used to assess the extent of infection and identify thrombosis. Magnetic resonance venography is particularly sensitive in detecting internal jugular vein thrombosis, while CT is more commonly available in clinical settings. Early recognition of these conditions is critical to prevent rapid deterioration, including respiratory failure, sepsis, and distant organ involvement.[3] Treatment involves a combination of broad-spectrum intravenous antibiotics targeting the common pathogens.[2] Reported occurrence of penicillin treatment failure due to beta-lactamase-producing F.necrophorum have led to the empirical recommendation of a beta-lactamase-resistant beta-lactams.[2,4] Most patients need antibiotic treatment for 6 weeks in order to ensure proper penetration into fibrin clots. Patients with metastases, respiratory difficulty from pulmonary

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Table 1. Investigations of the patient.

Parameters	At presentation	Day 2	Day 4	Day 5	Day 9	Day 15	At 4-week follow-up	Reference Ranges
Hemoglobin (gm/dL)	11.0	11.1	11.6	11.4	9.4	9.4	11.9	11.5-15.5
White blood cell count (cells/cumm)	19,740	19,700	22,410	18,820	8,770	7,990	7,460	5000-13,000
ANC (cells/ cumm)	16,187	16,768	16,808	-	-	-	3,130	2000-8000
ALC (cells/ cumm)	2,132	2,562	3,810	-	-	-	3,160	1000-5000
Platelets (10^5 cells/ cumm)	1.23	1.71	3.12	-	-	-	1.96	1.50-4.50
CRP (mg/dL)	111	-	-	35.4	20.2	5.0	10.4	0.3-10
PT (seconds)	21.3	-	21.2	-	-	-	14.4	10.3-13.1
INR	1.91	-	1.9	-	-	-	1.25	0.8-1.2
aPTT (seconds)	-	-	37	-	-	-	-	25-35

Note: ANC- Absolute neutrophil count, ALC- Absolute lymphocyte count, CRP- C-reactive protein, PT- Prothrombin time, INR- International Normalised Ratio, aPTT- Activated partial thromboplastin time.

thrombosis, abscess formation, or thrombus extension into the mediastinum or cerebrum may require surgical therapy. The role of anticoagulation in Lemierre syndrome is debated; while anticoagulation is not usually recommended for uncomplicated cases, it may be considered in the presence of significant clot burden, cerebral thrombosis, or failure to improve after 72 hours of appropriate antibiotic therapy. In all cases, supportive care, including fluid resuscitation and careful monitoring, is essential to managing these severe infections.[2,3] With prompt and appropriate treatment, the prognosis can improve, but both Ludwig's angina and Lemierre syndrome require urgent, coordinated management to prevent life-threatening outcomes. In our patient, we did not start anticoagulants as the thrombus was partial and did not extend to the brain or the mediastinum and the patient responded clinically to antibiotic therapy.

Compliance with ethical standards
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Conflict of Interest: None

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