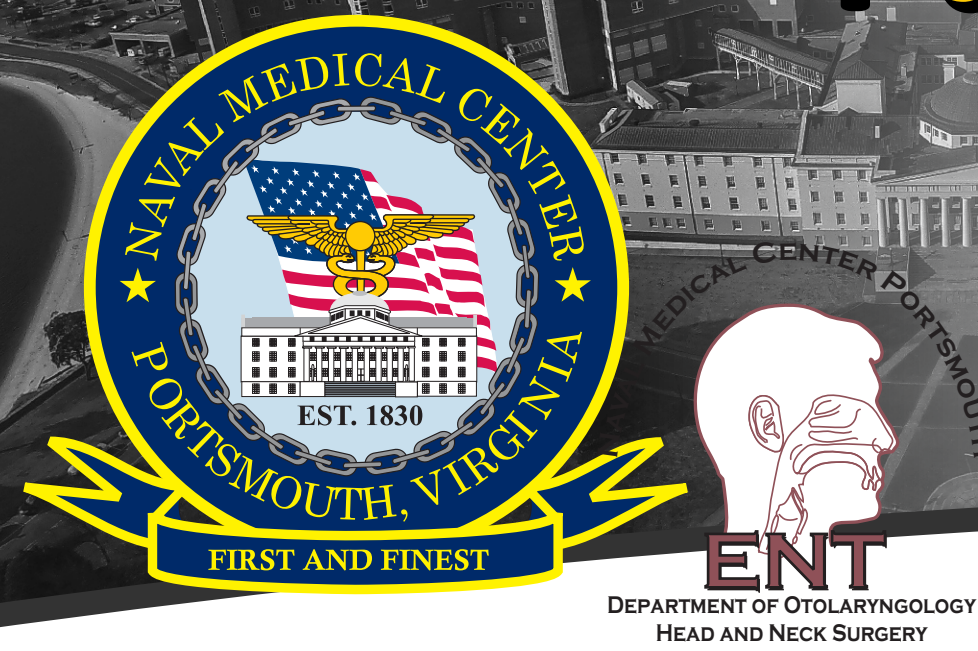


# Fuseform Bacteria Infections: A Case Series and Review of the Literature

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## Case

(Patient 1): 21 year old male presenting with right lateral neck soreness, progressing to a neck mass over 48 hours. Evaluation showing a firm and tender right sided level IIA-III mass, measuring 5cm at greatest diameter without other cervical lymphadenopathy. Patient was then admitted to the hospital and started on unasyn and vancymycin. Labs obtained were generally negative to include CBC, CMV, HIV, ESR, Monospot; however CRP was elevated. Given no change, the patient was taken back to the OR for I&D and further cultures in order to identify etiology of neck mass.

(Patient 2): 23 year old male presenting with rapidly enlarging right neck mass for 2 weeks. No history of throat pain or other respiratory infection Evaluation showing a right level III/IV heterogenous mass with diameter of 8cm. Labs relevant for white count of 14 with neutrophilic predominance. Aspirated at presentation and sent for further cultures and evaluation.

## Background

Lemierre's syndrome, first described in a paper by Andre Lemierre in 1936, is classically characterized by a history of recent oropharyngeal infection, clinic or radiological evidence of internal jugular vein thrombosis, and isolation of anaerobic pathogens, mainly fusobacterium necrophorum<sup>(1,2)</sup>. Patients are typically in the second decade of life and otherwise healthy males, most commonly present with fever (92-100%), but other associated symptoms can include throat pain, neck pain, or neck mass<sup>(1,2,3,7)</sup>.

The most common bacterial culprit is the genus *Fusobacterium*, which is a heterogeneous group of Gram negative, non-spore forming rods, with approximately 13 species inhabiting the oral, GI, upper respiratory tract, and vaginal mucosa<sup>(2,7)</sup>. *F. nucleatum* and *F. necrophorum* are the most commonly isolated pathogens within this genus<sup>(8)</sup>. The average time of infection to onset of septicemia is approximately one week, but only 2% of these species demonstrating resistance to Penicillin and it's derivatives<sup>(4,5)</sup>. Many species of the Fusiform bacteria correlate with a wide range of reported mortality, from 5% to 47%, with *F. necrophorum* generating a higher mortality<sup>(7,8)</sup>.



Figure 1: CT with contrast of Patient 1 with level IIA-III neck mass with minimal impingement of the venous system

## Pathogenesis

Those identified with Lemierre's syndrome are recommended to receive low molecular weight heparin with therapeutic aim of dissolving the previously identified jugular vein thrombosis<sup>(9)</sup>. However, given the increasing advancement of imaging and the availability of antibiotics, a wide clinical spectrum of patient presentations caused by fusobacterium infections has become most commonplace<sup>(11)</sup>. Because of the potential contribution to pharyngitis (up to 10%), recommendations for treatment include fever, tonsillar exudates, and cervical lymphadenopathy in order to potentially address underlying Fusobacterium infection<sup>(10)</sup>.

Source of Infection for Lemierre's Syndrome.	
Source of Infection	%
Tonsil	37
Pharynx/URTI	30
Chest/LRTI	25
Middle ear/mastoid	2
Larynx	2
Dental	1
Paranasal sinuses	1
Orbit	1
Metastatic disease	0.5
Gastrointestinal	0.4
Lip piercing	0.1

URTI - upper respiratory tract infection; LRTI - lower respiratory tract infection.

Figure 2: Infectious sources noted in 74 case studies before 2009<sup>(1)</sup>

Morbidity Encountered in Lemierre's Syndrome.	
Morbidity	%
Brain	30
Septic arthritis/osteomyelitis	22
Lung	22
Deep neck space infections	14
Pericardial tamponade	7
Liver	6
Mastoiditis	6
Spleen	6
Eye	5
Lower cranial nerve palsies	3

Figure 3: Complications of fusobacterium infections noted in 74 case studies before 2009<sup>(1)</sup>

## Treatment

Those identified with Lemierre's syndrome are recommended to receive low molecular weight heparin with therapeutic aim of dissolving the previously identified jugular vein thrombosis<sup>(9)</sup>. However, given the increasing advancement of imaging and the availability of antibiotics, a wide clinical spectrum of patient presentations caused by fusobacterium infections has become most commonplace<sup>(11)</sup>. Because of the potential contribution to pharyngitis (up to 10%), recommendations for treatment include fever, tonsillar exudates, and cervical lymphadenopathy in order to potentially address underlying Fusobacterium infection<sup>(10)</sup>.

Antimicrobial agent	% (n/n tested) of isolates	
	S	R
Penicillin	97% (34/36)	3% (1/36)
Amoxicillin and clavulanic acid	100% (35/36)	0%
Imipenem	100% (36/36)	0%
Clindamycin	100% (35/35)	0%
Metronidazole	97% (34/35)	3% (1/35)

Figure 4: Antibiotic susceptibility of fusobacterium between 1995 and 2017<sup>(9)</sup>.



Figure 5: Gram negative, non-spore forming rods. Fusiform culture collected from patient 2.



Figure 6: CT with contrast of Patient 2 demonstrating right neck mass with mass effect to the right external jugular vein.

## Discussion

Patient 1 underwent an I&D and cultures obtained, resulting in *F. necrophorum*. No venous complications were identified. The patient was transitioned from IV antibiotics to 21 days of oral Augmentin. The patient recovered without further sequelae.

Patient 2 was found to have pulmonary septic emboli, initiating heparin treatment and PICC placement for long term use of IV zosyn. Cultures obtained via aspiration showed *Fusobacterium necrophorum*. Patient continued longer term IV antibiotics for 6 weeks in addition to 6 months of xarelto.

Both patients recovered without issue, and while both were diagnosed with *Fusobacterium* infection, they both demonstrated the various progressions of disease and possible treatment algorithms.

### Key Learning Points...

- *Fusobacterium* may cause pharyngitis in primarily young, healthy males
- Penicillin or cephalosporin can be used for empirical treatment
- If associated neck swelling, a CT should be done to evaluate for possible external jugular thrombosis or impingement
- If venous involvement identified, blood thinner should be initiated
- Consult ENT and infectious disease

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