AMNIOTIC FLUID EMBOLISM FOUNDATION

AMNIOTIC FLUID EMBOLISM

MEDICAL EXAMINER FACT SHEET

WHAT IS AFE?

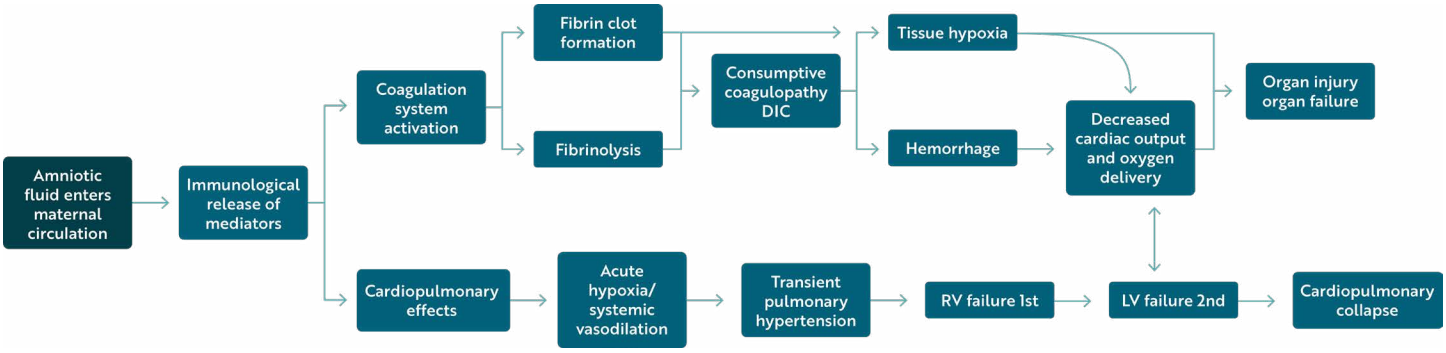
Amniotic fluid embolism (AFE) is characterized by the acute and rapid collapse of the mother and baby as a result of an anaphylactic-like reaction to the entrance of amniotic fluid or fetal debris entering the maternal circulatory system; a normally benign result of delivery. The reported incidence of AFE ranges from 1.9 to 6.1 per 100,000 deliveries with a mortality rate ranging from 20-60%.

A CENTURY OF LOSS

Amniotic fluid embolism was first identified in 1926 through autopsy findings, yet nearly a century later, our understanding of the condition remains limited.

PATHOPHYSIOLOGY

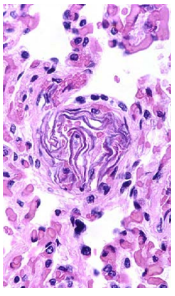
AFE appears to result from an abnormal maternal response to amniotic fluid entering the mother's bloodstream during labor and birth. Entry of fetal cells and amniotic fluid into the bloodstream is a normal occurrence. However, some mothers mount a massive, abnormal immune response similar to anaphylaxis. Pulmonary obstruction is no longer considered a pathophysiologic component of AFE.



CLINICAL PRESENTATION

Amniotic fluid embolism most often occurs during labor, delivery, or shortly after and can cause a severe, rapid decline in the mother's health. In classic cases of AFE, women will exhibit a triad of symptoms including hypoxia, hypotension, and coagulopathy often resulting in sudden cardiovascular collapse or cardiac arrest. In atypical cases, one or more of these signs may be absent. Initial symptoms may include increased anxiety, agitation, impending sense of doom, confusion, nausea, or shortness of breath that are accompanied by abnormal vital signs, loss of consciousness, seizure, and cardiopulmonary arrest. Fetal hypoxia and fetal heart rate abnormalities often precede maternal cardiopulmonary manifestations. Coagulopathy is also a major component of AFE, although some patients may pass before their clotting status can be assessed.

DIAGNOSIS



AFE is a diagnosis of exclusion and can only be achieved through a thorough clinical review, excluding any other causes, and a thorough pathologic and histologic evaluation. The presence of fetal squames in the maternal circulation is not diagnostically definitive but is suggestive in cases with a consistent clinical scenario.

Image left: Squames within the pulmonary artery. Picture from flickr.com

WHY AUTOPSIES ARE ESSENTIAL IN AFE DIAGNOSIS

A high degree of suspicion is warranted when presumed cases of AFE are reported. The rarity and complexity of AFE can lead to an over-reliance on clinical intuition. Studies suggest that autopsies frequently uncover previously undiagnosed conditions or complications that can lead to alternative diagnoses.

Autopsies allow for:

- Exclusion of other causes
- Identification of histologic findings
- Any concomitant factors
- Evaluation of treatment
- Contribution to medical knowledge
- Closure for loved ones

WHY AUTOPSIES AREN'T ALWAYS PERFORMED

Cases of maternal death appear to cause a great deal of jurisdictional confusion. Providers often assume a witnessed, natural death in a hospital is ineligible for an autopsy and do not notify the appropriate authorities. Additionally, when cases have been reported, the coroner/ ME has declined the case.

Deaths due to a probable or presumed AFE should be brought in for autopsy as it is a diagnosis of exclusion. It is also the unexpected death of an otherwise healthy individual and is often associated with surgical treatment such as cesarean section or hysterotomy.

CURRENT FUNDING OPPORTUNITIES FOR MATERNAL AUTOPSIES

The AFE Foundation provides funding for private autopsies in presumed cases of AFE that meet specific qualifications. Hospitals and medical examiners are encouraged to contact the AFE Hotline 1-307-363-2337 to request approval.

The following states have established maternal autopsy programs:

- Alabama Department of Public Health Maternal Autopsy Program (MAP): *alabamapublichealth.gov/blog/2024/05/nr-21.html*
- Washington State Department of Health - Maternal Death Reporting and Death Investigation Requirements: *doh.wa.gov/sites/default/files/legacy/Documents/Pubs/7141-011MaternalMortalityAutopsyandDeathInvestigation.pdf*
- Georgia - Senate Bill 496: *legis.ga.gov/api/legislation/document/20212022/206250*

AFE REGISTRY AND BIOREPOSITORY

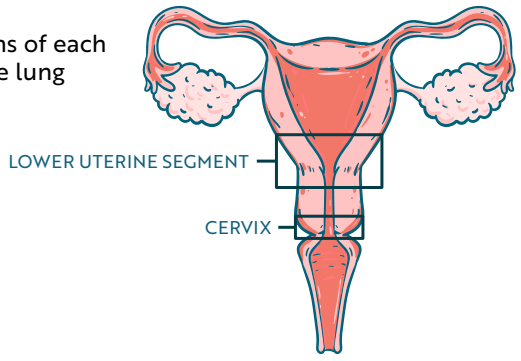
One of the primary objectives of the AFE Foundation is to advance research to elucidate the etiology and pathophysiology of AFE. Through this understanding, we aim to establish an effective treatment, a mechanism for predictability, and a gold-standard diagnostic test.

The AFE Registry is the comprehensive collection of cases that gather vital information on the efficacy of treatments, and reproductive and long-term health of survivors of AFE, and also serves as a basis for clinical research.

The AFE Biorepository allows for the collection, storage, and examination of blood and tissues from AFE patients. Considerable focus is on the identification of mechanisms of disease and the biomarkers responsible for this syndrome. The AFE Registry and Biorepository reside at the University of Texas Health Science Center / McGovern Medical School in Houston, Texas.

SPECIMENS WE ARE COLLECTING

- Maternal blood that has been previously collected for clinical care before the diagnosis of AFE syndrome (i.e., type and screen)
- Maternal blood was taken during the event but before transfusion
- Pathological specimens from the placenta or surgical pathology specimens (i.e., placenta, uterus, etc.)
- Autopsy specimens (FFPE Tissue Blocks):
  - Ectocervix/endocervix
  - Lower Uterine Segment full-thickness transmural section
  - Brain
  - Heart
  - 1-2 Sections of each lobe of the lung



HOW TO SUBMIT SPECIMENS

Contact the AFE Hotline at 1-307-363-2337 immediately following a possible or suspected AFE event, and for up to 7 days afterward.For cases beyond 7 days, complete the Submit a Case Form.

← SUBMIT A CASE

MORE ABOUT THE AFE FOUNDATION

The Amniotic Fluid Embolism Foundation, a non-profit organization founded in 2008, quickly united the voices of families, survivors, medical professionals, and researchers to call for greater awareness and resources to reduce the threat of amniotic fluid embolism (AFE). Our collective efforts have resulted in an internationally recognized research program on AFE, highly sought-after educational programming for healthcare providers, and a worldwide network of support groups and resources for those impacted by an AFE.

Visit www.afesupport.org for resources for grieving families.

FURTHER READING

"On analyzing 42 autopsy specimens of cases of maternal death, 36% of causes of death by autopsy were discordant with the clinical diagnosis. Moreover, of the 38% of non-autopsied maternal deaths, the cause of death could not be clarified from the clinical chart. Detailed autopsies are necessary to clarify the precise pathologic evidence related to pregnancy and delivery, especially causes of unexpected death such as amniotic fluid embolism."

Wakasa, T., Ishibashi-Ueda, H., & Takeuchi, M. (2021). Maternal death analysis based on data from the nationwide registration system in Japan (2010-2018). Pathology International, 71(4), 223–231. https://doi.org/10.1111/pin.13076

"Amniotic fluid may induce distinct thrombus formation in the uterus and lungs. Pulmonary and uterine thrombi formation may contribute to cardiorespiratory collapse and/or consumptive coagulopathy in AFE."

Yamashita, A., Oda, T., Aman, M., Wakasa, T., Gi, T., Ide, R., Todo, Y., Tamura, N., Sato, Y., Itoh, H., & Asada, Y. (2023). Massive platelet-rich thrombus formation in small pulmonary vessels in amniotic fluid embolism: An autopsy study. BJOG: An International Journal of Obstetrics and Gynaecology, 130(13), 1685–1696. https://doi.org/10.1111/1471-0528.17532

"All this, moreover, underlines the indispensability of the post-fatal histological examination to reach the correct diagnosis of this entity, which could otherwise go unnoticed. In conclusion, amniotic embolism is unfortunately confirmed as a sudden, severe, and highly lethal obstetric complication even today, which is why both clinicians and forensic pathologists must be aware of it to implement the most appropriate diagnosis from their respective points of view."

Gentilomo, A., Tambuzzi, S., Gentile, G., Boracchi, M., Andreola, S., & Zoia, R. (2024). Post-mortem diagnosis of amniotic fluid embolism. Autopsy & Case Reports, 14, e2024472. https://doi.org/10.4322/acr.2024.472

"There is a substantial discrepancy between clinical and autopsy causes of maternal death which necessitates asking for an autopsy in cases of maternal mortality of uncertain cause."

Ghalib Yassin, B. A., Hassan Al-Safi, A. M., & Al-Saneed, E. H. (2022). Autopsy versus Clinical Decisions Regarding Causes of Maternal Death in Iraq. Indian Journal of Community Medicine: Official Publication of Indian Association of Preventive & Social Medicine, 47(2), 177–181. https://doi.org/10.4103/ijcm.ijcm_571_21