

Fatal Anaphylaxis Following Measles Vaccination: A Forensic Autopsy-Based Case Report

Parimal Chauhan¹, Darshan D Galoria² and Pradip S Rana³

¹Resident, Forensic Medicine and Toxicology, Pramukhswami Medical College & Shree Krishna Hospital, Karamsad, Gujarat, India.

²Senior Resident, Forensic Medicine and Toxicology, Pramukhswami Medical College & Shree Krishna Hospital, Karamsad, Gujarat, India.

³Senior Resident, Forensic Medicine and Toxicology, Pramukhswami Medical College & Shree Krishna Hospital, Karamsad, Gujarat, India.

***Correspondence:** Dr. Parimal Chauhan Department of Forensic Medicine & Toxicology, Pramukhswami Medical College, Karamsad, Gujarat, India. <parimal.chauhan1710@gmail.com>

DOI: <https://doi.org/10.48165/ijjfmt.2026.24.12.06>

ABSTRACT

Adverse Events Following Immunization (AEFI), though rare, remain an important area of forensic and public health concern, particularly when death occurs within hours of vaccine administration. We report the case of an individual who died approximately 6–7 hours after receiving a measles vaccine, with no significant comorbidities identified on history. Autopsy revealed features of systemic asphyxia with visceral congestion, and histopathological examination of the injection site demonstrated marked mast cell and eosinophilic infiltration, supported by elevated serum total IgE. Microbiological cultures and Forensic Science Laboratory (FSL)/viscera chemical analysis were negative for infective and toxic causes. Based on the correlation of clinical history, gross autopsy findings, ancillary investigations, and histopathology, the cause of death was certified as anaphylaxis and its complications following measles immunization. This case illustrates the essential role of a systematic, guideline-based AEFI autopsy protocol in establishing causality and excluding alternative causes of death.

Keywords: AEFI; anaphylaxis; measles vaccine; forensic autopsy; mast cells; eosinophils; IgE; sudden death

INTRODUCTION

Vaccination is among the most effective public health interventions, but rare fatal adverse events following immunization continue to raise medico-legal and public health concerns. Anaphylaxis is a recognized, though uncommon, immediate hypersensitivity reaction to vaccine components, typically manifesting within minutes to a few hours of administration [2,3]. When death occurs in close temporal association with vaccination, a comprehensive medico-legal autopsy is essential — both to establish an accurate cause of death and to provide a scientifically defensible causality assessment, in line with WHO AEFI investigation guidelines and Brighton Collaboration case definitions for anaphylaxis [1,2].

This report describes the postmortem evaluation of a death occurring 6–7 hours after measles vaccination, with emphasis on autopsy findings, histopathological correlation, and exclusion of infective and toxicological causes. Fatal and non-fatal anaphylaxis specifically following measles-containing vaccines, though rare, has

been documented in the literature [5].

CASE HISTORY

The deceased received a measles vaccine as part of routine/scheduled immunization. Approximately 6–7 hours later, on the same day, the individual developed an acute, rapidly progressive illness and died before further medical intervention could be instituted. There was no documented history of prior allergic reactions, comorbid illness, or trauma. The case was referred for medico-legal autopsy in view of the temporal association between vaccination and death.

AUTOPSY FINDINGS

No significant external injuries were noted. Peripheral cyanosis was present, consistent with a terminal asphyxia process. On internal examination all major viscera were congested on gross examination. The lungs were markedly congested and oedematous, with frothy fluid present within the airways — findings consistent with an asphyxia

mode of death. Generalized visceral congestion and peripheral cyanosis supported a systemic asphyxial process as the terminal event. No macroscopic evidence of aspiration pneumonia or myocarditis was identified on gross examination; however, representative tissue samples were retained for histopathological confirmation, since early or focal pathology of this kind can be missed grossly.

SAMPLES COLLECTED

(AEFI Autopsy Protocol)

In accordance with standard AEFI autopsy guidelines [1,2,9], the following specimens were systematically collected for cause-of-death evaluation and causality assessment:

1. Viscera for histopathological examination (HPE): lungs, heart, pharynx, and other major organs.
2. Skin and muscle from the left thigh injection site, along with control samples from the contralateral (non-injection site) thigh, to specifically evaluate local tissue reaction.
3. Blood, cerebrospinal fluid (CSF), and peritoneal fluid for bacterial and fungal culture, to exclude an infective/septic cause.
4. Blood for serum HIV, HBsAg, and HCV testing, to rule out underlying immunocompromise or infection that could confound interpretation.
5. Blood for immunological work-up, including total serum IgE, to assess for a Type I hypersensitivity mechanism.
6. Viscera and body fluids for FSL (chemical/toxicological) analysis, to exclude poisoning or drug-related causes of death.

Forensic Science Laboratory (FSL) Report was negative (nil), effectively ruling out a toxicological cause of death. The microbiology report was negative (nil) for blood culture, excluding sepsis or an underlying infective process as a contributing or causal factor.

HISTOPATHOLOGICAL

Examination (HPE)

Lung sections: Congestion and oedema were noted, without histological features of aspiration pneumonia.

Myocardial sections: No evidence of myocarditis or other primary inflammatory cardiac pathology was identified, excluding a primary cardiac cause of sudden death.

Left thigh injection site (skin and muscle): Sections demonstrated prominent mast cell and eosinophilic infiltration within the muscle and surrounding soft tissue. This localized cellular infiltrate is strongly suggestive of an acute local anaphylactic/hypersensitivity reaction at the site of vaccine administration. Control sections from the

contralateral, non-injected thigh did not show comparable infiltration, supporting a localized rather than incidental or systemic inflammatory process.

Pharyngeal sections: Submucosal oedema with oedema fluid was noted, consistent with upper airway/laryngopharyngeal involvement — a recognized cause of asphyxial death in anaphylaxis (angio-oedema of the airway).

Immunological Study

Total serum IgE was elevated (reported value, e.g., 110 IU/mL — to be corrected to the actual laboratory value and reference range). Elevated IgE in this clinical and pathological context supports a Type I (IgE-mediated) hypersensitivity mechanism, consistent with the acute onset of symptoms shortly after vaccine exposure [4,8].

DISCUSSION

The correlation of a clear temporal sequence (death within 6–7 hours of vaccination), negative toxicological and microbiological work-up, and characteristic histopathological findings at the injection site and airway together fulfil the essential criteria for a diagnosis of fatal anaphylaxis following immunization:

Temporal plausibility: Onset of fatal symptoms within hours of vaccine administration is consistent with the recognized time-course of immediate (Type I) hypersensitivity reactions, which typically manifest within minutes to a few hours [2,5].

Exclusion of alternative causes: Negative FSL analysis excludes poisoning; negative microbiological culture and viral serology exclude sepsis and infective causes; absence of myocarditis on histopathology excludes a primary cardiac inflammatory cause; absence of aspiration pneumonia on histopathology excludes aspiration as the asphyxial mechanism [10].

Positive local and systemic markers of hypersensitivity: Dense mast cell and eosinophil infiltration at the injection site is a well-recognized histological marker of local anaphylactic/allergic tissue reaction. Pharyngeal submucosal oedema explains the asphyxial mechanism of death, via upper airway obstruction (laryngeal/pharyngeal angio-oedema), correlating with the grossly congested, oedematous lungs and frothy airway fluid noted at autopsy. Elevated total serum IgE supports an IgE-mediated (Type I) hypersensitivity mechanism at the systemic level [4,8].

Taken together, these findings are consistent with the WHO AEFI causality assessment framework and the Brighton Collaboration case definition criteria for anaphylaxis, supporting a consistent causal association

between the measles vaccine administration and death [1,2,3].

Anaphylaxis in this case appears to have caused death primarily through an asphyxial mechanism, secondary to upper airway (pharyngeal/laryngeal) oedema, compounded by pulmonary congestion and oedema — consistent with the classic pathophysiology of anaphylactic shock: mast cell/basophil degranulation → release of histamine and other mediators → increased vascular permeability, bronchoconstriction, and mucosal oedema → airway compromise and systemic hypoperfusion [6,8,10].

Based on the history, autopsy findings, and results of histopathological, microbiological, immunological, and FSL investigations, the cause of death is certified as: **Anaphylaxis and its complications.**

CONCLUSION

This case underscores the importance of a systematic AEFI-specific autopsy protocol — combining gross examination, targeted histopathology of the injection site and airway, ancillary microbiology, toxicology (FSL), and immunological work-up — in accurately establishing anaphylaxis as a cause of death following vaccination [1,9]. Careful exclusion of infective, toxicological, and other structural causes, together with corroborative histological evidence of mast cell/eosinophilic infiltration and elevated IgE, allows a scientifically sound and medico-legally defensible causality determination in AEFI-related deaths [4,6,7].

REFERENCES

- World Health Organization. (2019). *Causality assessment of an adverse event following immunization (AEFI): User manual for the revised WHO classification*. World Health Organization.
- Rüggeberg, J. U., Gold, M. S., Bayas, J. M., Blum, M. D., Bonhoeffer, J., Friedlander, S., de Souza Brito, G., et al., & Brighton Collaboration Anaphylaxis Working Group. (2007). Anaphylaxis: Case definition and guidelines for data collection, analysis, and presentation of immunization safety data. *Vaccine*, 25(31), 5675–5684. <https://doi.org/10.1016/j.vaccine.2007.02.064>
- Gold, M. S., Amarasinghe, A., Greenhawt, M., Kelso, J. M., Kochhar, S., Thong, B. Y.-H., Top, K. A., Turner, P. J., Worm, M., & Law, B. (2023). Anaphylaxis: Revision of the Brighton Collaboration case definition. *Vaccine*, 41(15), 2605–2614. <https://doi.org/10.1016/j.vaccine.2023.02.051>
- Palmiere, C., Tettamanti, C., & Scarpelli, M. P. (2017). Vaccination and anaphylaxis: A forensic perspective. *Croatian Medical Journal*, 58(1), 14–25. <https://doi.org/10.3325/cmj.2017.58.14>
- Sipahi, S., Ozceker, D., Gokcay, G., Guler, N., & Tamay, Z. (2019). A case of anaphylaxis to measles vaccination in an infant with cow's milk allergy. *Pediatric Allergy, Immunology, and Pulmonology*, 32(3), 135–138. <https://doi.org/10.1089/ped.2019.1033>
- Tomassini, L., Ricchezza, G., Gambelunghe, C., Lancia, M., Gramaccia, M., De Micco, F., Fedeli, P., Cingolani, M., & Scendoni, R. (2025). Beyond the numbers: Critical analysis of the role of postmortem tryptase in the forensic diagnosis of anaphylaxis. *Journal of Forensic Sciences*, 70(6), 2117–2128. <https://doi.org/10.1111/1556-4029.70046>
- Radheshi, E., Reggiani Bonetti, L., Confortini, A., Silingardi, E., & Palmiere, C. (2016). Postmortem diagnosis of anaphylaxis in presence of decomposition changes. *Journal of Forensic and Legal Medicine*, 38, 97–100. <https://doi.org/10.1016/j.jflm.2015.12.016>
- Wang, X., Yin, C., Su, X., & Su, M. (2020). Reliable postmortem molecular diagnosis of anaphylaxis: Co-localization of mast cell degranulation and immunoglobulin E in allergic throat tissues. *American Journal of Forensic Medicine and Pathology*, 41(4), 286–291. <https://doi.org/10.1097/PAF.0000000000000576>
- Parmar, P., & Rathod, G. (2024). Adverse events following immunization (AEFI): Current trends, latest autopsy protocol, Indian scenario, and statistics. *International Journal of Forensic Sciences*, 9(1), 000362.
- Delage, C., & Irely, N. S. (1972). Anaphylactic deaths: A clinicopathologic study of 43 cases. *Journal of Forensic Sciences*, 17(4), 525–540.

How to Cite this Article: Chauhan P., Galoria D.D., Rana P.S.. (2026). Fatal Anaphylaxis Following Measles Vaccination: A Forensic Autopsy-Based Case Report. *IJJFMT*, 24(1&2), 27-29. <https://doi.org/10.48165/ijjfmt.2026.24.12.06>