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Case Series of Pediatric Special Cases on Autopsy

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ABSTRACT

Context: Medico-legal autopsy is performed to find out the cause, time of death and identify diseases which could have contributed to the death. Gross and microscopic examination, toxicological analysis and laboratory investigations will aid in establishing the cause of death. Histopathological analysis is considered as the gold standard in finding out a cause of death in cases of sudden death or when there is no history of any previous illness.

Methods and Material: Four infant autopsies were conducted and their respective organs which included lungs, liver and brain and were received in our department.

Statistical Analysis used: Results were tabulated, analyzed, and subjected to statistical analysis using SPSS (Statistical Package for Social Sciences) Software (Trial version).

Results: First case showed fat emboli which was an incidental finding. Second was a case of hyaline membrane disease in a newborn. Third one was a case of steatohepatitis in a 9 month old child and the last one was an incidental finding of gemistocytic astrocytoma which was undiagnosed antemortem.

Conclusion: The precise cause of death must be determined with reference to clinical, autopsy, and forensic findings before reporting histopathological finding. Histopathology in autopsy plays a vital role in the study of some of the rare lesions contributing to the knowledge of pathology. This study highlights the various incidental and rare cases in autopsies, which are of critical value in academic and research purposes.

Keywords: Fat emboli; Gemistocytic astrocytoma; Hyaline membrane disease; Autopsy; Incidental finding.

Key Messages: Histopathological evaluation of various incidental and rare cases in autopsies.

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INTRODUCTION

Medico-legal autopsy is performed to find out the cause, time of death and identify diseases which could have contributed to the death. Gross and microscopic examination, toxicological analysis and laboratory investigations will aid in establishing the cause of death. Histopathological

analysis is considered as the gold standard in finding out a cause of death in cases of sudden death or when there is no history of any previous illness. Histopathological analysis may reveal co existing diseases or incidental findings which may not have been diagnosed ante mortem. Sometimes such diseases must have caused sudden death and was diagnosed only at autopsy. These incidental findings may serve as a learning tool for pathologists and also to assess the mortality statistics which play an important role in health and treatment planning. Various studies have proved that autopsy helps to establish the cause of death as well as to study disease in situ thus enriching medical knowledge and making various rare diagnoses.

Autopsy of newborns and infants can provide vital information to clinicians and families about the causes of death and the accuracy of antemortem clinical diagnosis. Since clinical manifestations of conditions in newborn infants are often nonspecific, unintentionally delayed, wrong, or missed diagnoses are still inevitable. The present study was undertaken to evaluate the various accidental findings that were undiagnosed during the person's life.

CASE SERIES

We present a case series of four pediatric patients where interesting incidental findings were obtained on autopsy without any specific antemortem clinical diagnosis.

Case 1

The first interesting case was that of a two days old male baby brought dead to hospital. The lung appeared normal on gross examination.

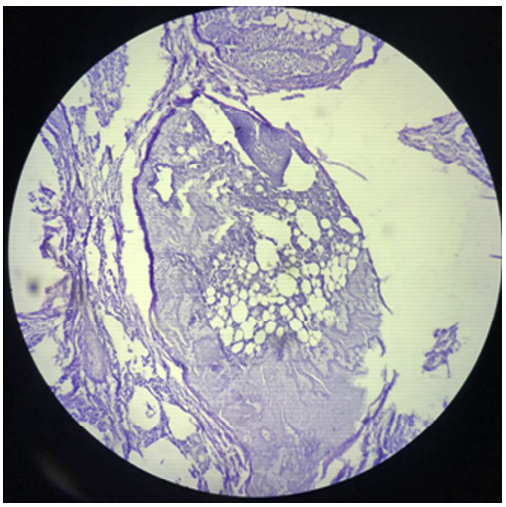

Fig. 1: H & E showing deposition of fat cells in the alveolar parenchyma.

Microscopy from lung tissue showed dilation and disruption of alveoli. At places alveoli were filled with fluid. Interalveolar septa showed inflammatory cell infiltrate. Blood vessels showed congestion, fat globules and nuclear debris which lead to the diagnosis of fat embolism.

Case 2

Patient 2, was a 2 days old male baby who was admitted to the nicu with chief complaints of respiratory distress but died within 2 days of admission. Autopsy was done and histopathological examination of lungs were characterized by typical hyaline membrane lining the respiratory

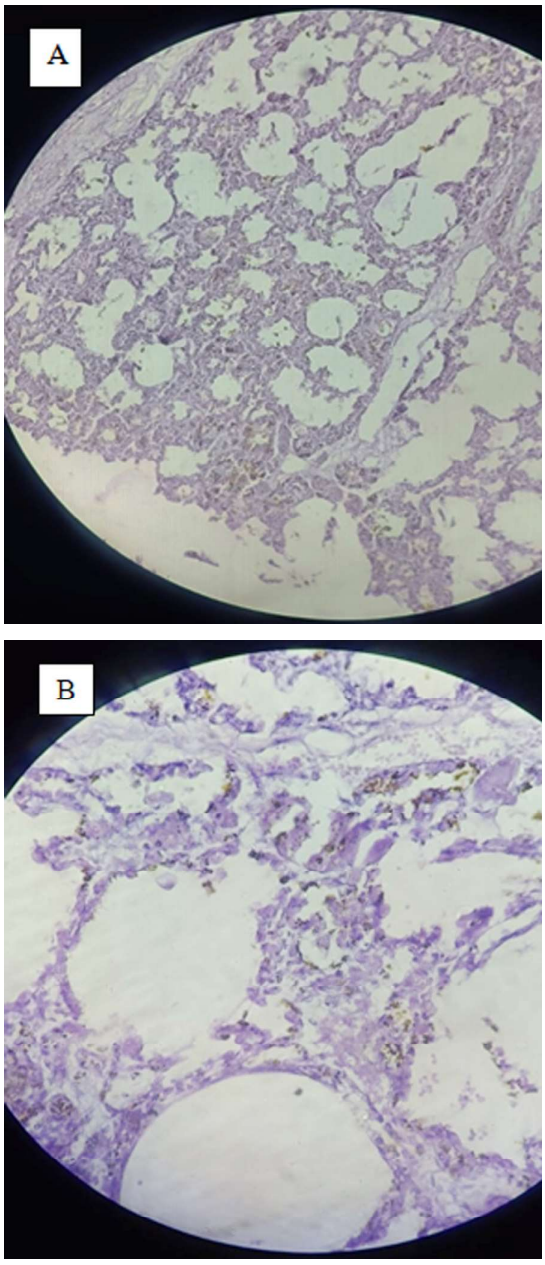

Fig. 2 A & B: H & E micrograph showing deposition of hyaline membrane in the alveoli. A: 10x view, B: 40x view.

bronchioles and alveolar ducts. Other prominent findings were atelectasis, interstitial edema and congestion and lymphatic dilatation. This disease, associated with surfactant deficiency in premature infants, is characterized by eosinophilic hyaline membranes lining the airspaces, bronchioles, and alveolar ducts. There is little inflammatory reaction.

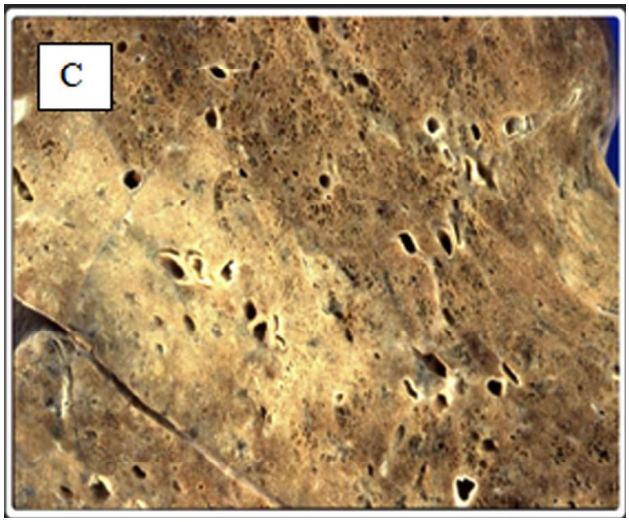

Fig. 2 C: Gross image of hyaline membrane disease.

Case 3

Patient 3, a 9-month old male was admitted in the NICU with the complaints of fever and abdominal distention who died within a day of admission. Autopsy was done. Grossly the liver appeared shrunken with presence of multiple small yello wish nodules. Microscopy showed extensive fatty changes, periportal inflammatory cell infiltrate along with presence of focal fibrotic changes and congestion. The diagnosis of steatohepatitis was made corresponding with the gross and microscopic features.

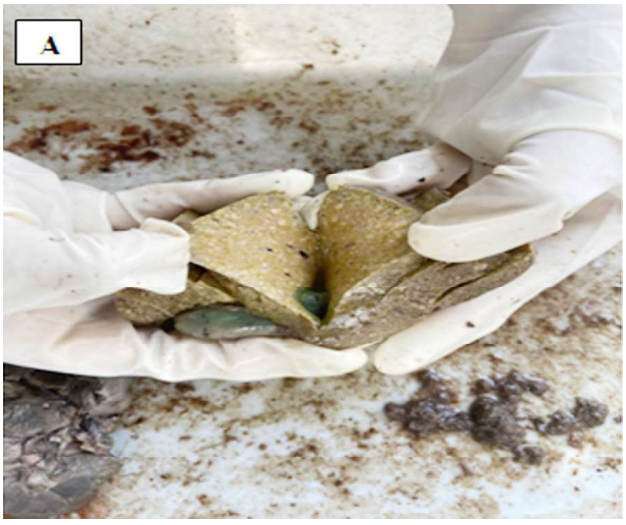

Fig. 3A: Gross image of shrunken liver showing yellowish nodular deposits.

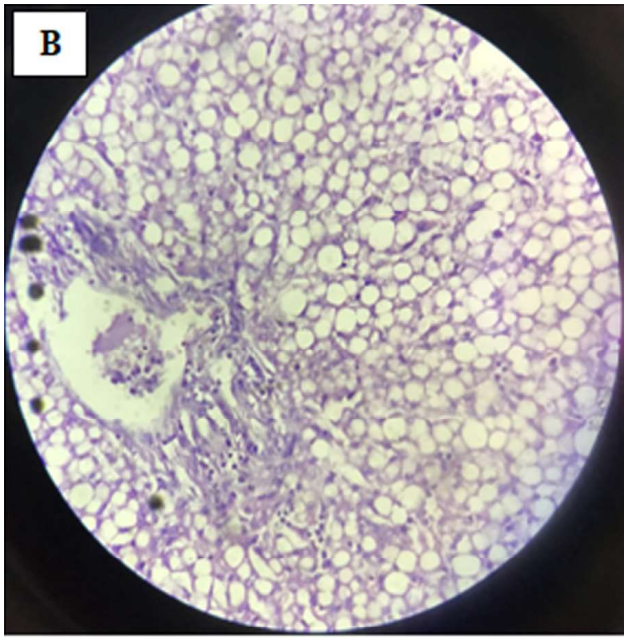

Fig. 3B: H & E micrograph showing extensive mixed (microvesicular and mancrovesicular) fatty changes.

Case 4

A 9-year-old male child was brought dead to the hospital. The attenders gave history of seizures. The histopathological examination of brain after autopsy revealed presence of fair number of gemistocytes that are large tumor cells with abundant dense eosinophilic, and eccentrically displaced nucleuswith small nucleoli. Perivascular lymphocytic cuffing was noted.

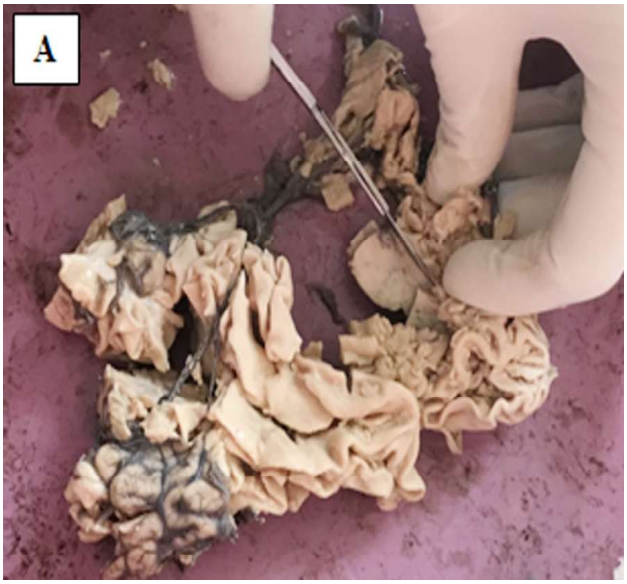

Fig. 4A: Gross image of a single well defined nodule in the brain tissue.

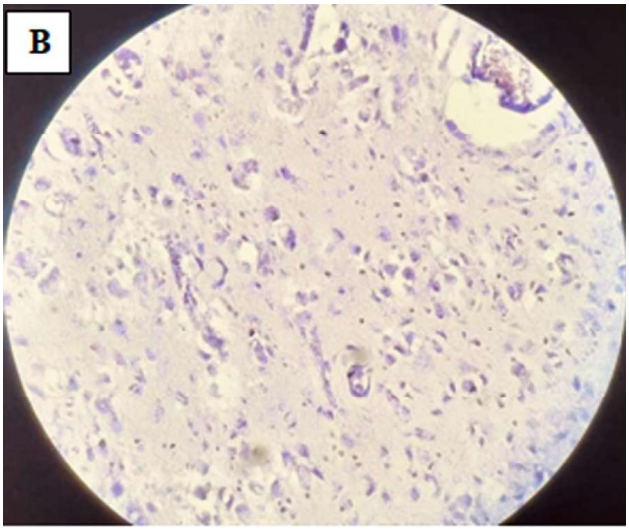

Fig. 4B: H & E micrograph showing large tumor cells (gemistocytes) having abundant eosinophilic cytoplasm and eccentric nuclei.

MATERIALS AND METHODS

A prospective study of four infant autopsies was conducted and their respective organs which included lungs, liver and brain and were examined which were received in MGM Medical college Indore for pathology department for evaluation.

RESULTS

The histopathological examination of autopsies showed following results:

1. Fat emboli which was an incidental finding.
2. Second was a case of hyaline membrane disease in a newborn.
3. Third one was a case of steatohepatitis in a 9 month old child.
4. And the last one was an incidental finding of gemistocytic astrocytoma which was undiagnosed antemortem.

DISCUSSION

Case 1

Fat embolism is characterized by the presence of fat globules in the circulatory system. This is very common condition especially after long bone fractures and in several other conditions, such as surgery, septicemia, sickle-cell anemia, pancreatitis, acute respiratory distress, osteomyelitis, and cardiopulmonary resuscitation (CPR). The lungs, central nervous system, skin, and kidneys are the most frequently affected organs in FE, and mortality due to this complication is about 5–15%.

Isolated pulmonary FE (IPFE) is a particular manifestation of FE characterized by the presence of fat globules in pulmonary vessels, without any evidence of FE in other organs. The presumable diagnosis of IPFE is difficult due to obscured clinical symptoms, and laboratory and radiological findings are not always indicative. Therefore, definitive diagnosis of this is established by histopathological examinations of postmortem lung tissue samples.

Etiological factors contributing to the development of IPFE have not been clearly documented, especially in atraumatic patients without known risk factors. Though studies have reported that a number of patients with pulmonary FE also had CPR history, more data are still required about the contributions of CPR to the development of IPFE.

Case 2

Pulmonary pathology is one of the commonest causes of death in preterm babies in most of the autopsy studies. The thyroid transcription factor-1 (TTF-1) plays a vital role in morphogenesis of lung and differentiation of pulmonary epithelial cells as well as in the transcription of surfactant proteins and Clara cell secretory protein. Hyaline membrane disease is a type of acute lung injury seen in neonates. Hyaline membrane disease occurs as a result of surfactant deficiency owing to prematurity. Though surfactant granules can be seen in lungs as early as 20 weeks of gestation, surfactant is produced in sufficient quantities only around 34 weeks. Surfactant deficiency leads to increased alveolar surface tension, along with subsequent resistance to inflation which results in collapse of the alveoli at the end of expiration. In this process, the alveoli become injured, as a result of shear stresses on the alveolar walls. Increase in either mechanical ventilation pressures or the respiratory effort can lead to severe form of lung injury ultimately leading to diffuse alveolar damage.

Case 3

Various conditions, more commonly chronic liver diseases, can lead to cirrhosis in children and adolescents. In infants, cirrhosis is most often caused by biliary atresia and genetic metabolic diseases, while in older children, it tends to result from autoimmune hepatitis, Wilson's disease, alpha-1-antitrypsin deficiency and primary sclerosing

cholangitis. Histologic features of pediatric liver diseases are mild steatosis which may mimic nonalcoholic fatty liver disease or nonalcoholic steatihepatitis. With progressive parenchymal damage, fibrosis and cirrhosis develop.

Case 4

In the 5th edition (2021) of the WHO classification of CNS tumors, the term gemistocytic astrocytoma is no longer recognized as a specific diagnosis. Rather, gemistocytic differentiation is a feature that may be observed in both IDH mutant and wild-type astrocytic tumors.

Gemistocytic astrocytomas, as an isolated variant, account for no more than 10% of WHO grade II astrocytomas. Histologic preparations of gemistocytic astrocytomas readily reveal the distinctive cells with large eosinophilic, plump to slightly angulated cytoplasm, and eccentric nuclei. The tumor cells may project short, delicate glial processes that confer a mildly fibrillated pattern to the tumor matrix. Multinucleate cells are not uncommon, but a highly variable small glial cell component appears to be mitotically active, in contrast to the gemistocytic tumor cells. Strong GFAP immunoreactivity in the gemistocytes is consistent with the ultrastructural finding of numerous bundles of intracytoplasmic filaments. Perivascular lymphocytic infiltrates appear to be more common in this variant than in other astrocytomas. Gemistocytic astrocytomas may behave more aggressively 201 than other WHO II diffuse astrocytomas, and around 80% of these tumors progress to glioblastoma. Molecular genetic analyses of gemistocytic astrocytomas indicate that TP53 mutations are a genetic hallmark of this variant, whereas PTEN mutations are absent in low grade and rare in anaplastic gemistocytic astrocytomas.

CONCLUSION

The precise cause of death must be determined with reference to clinical, autopsy, and forensic findings before reporting histopathological finding. Histopathology in autopsy plays a vital role in the study of some of the rare lesions contributing to the knowledge of pathology. This study highlights the various incidental and rare cases in autopsies, which are of critical value in academic and research purposes. Certain findings in our study lead to conclusive diagnosis and helped in reaching the diagnosis, some of which were indeterminate at the time of death. These incidental findings in autopsy has revealed the histopathological changes that help in the understanding of disease processes which are otherwise rare for a pathologist to encounter in the day to day specimens.

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