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CASE REPORT

Sudden Death due to Glioblastoma NOS: A Rare Medicolegal Autopsy Case Report in Indian Scenario

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Abstract :

Even though the era has grown up into tremendous technological advances in health care, diagnosis of sudden death is still challenging.[1] The definition of sudden death predominantly depends upon the duration and onset of symptoms.[2] According to the World Health Organization (WHO) and International Classification of Diseases, version 10 (ICD-10) sudden death is non-violent and not otherwise explained, occurring less than 24 hours from the onset of symptoms.[3] There are several studies across the world that give ideas about patterns and profiles of cases of sudden death in relation to different age groups. [4-10] As mentioned in one of the studies, sudden deaths due to an undiagnosed primary intracranial neoplasm are exceptionally rare ones, with reported frequencies in the range of 0.02% to 2.1% in medico-legal autopsy series. Out of which, only 12% of all cases of sudden, unexpected death due to primary intracranial tumors are due to Glioblastomas.[11] The present case report describes the autopsy diagnosis of Glioblastoma NOS (Not Other wise Specified) in a case of sudden and unexplained death of a 40-year-old apparently healthy male.

A complete methodological forensic approach by means of autopsy, histological and immuno-histo-chemical examinations is important to label it a case of glioblastoma and relative complication with the rapid increase of intracranial pressure as the cause of death. Although modern diagnostic imaging techniques have revolutionized the diagnosis of brain tumors, the autopsy, careful gross examination, and section of the fixed brain (with coronal section) are still the final word in determining exact location, topography, mass effects, histology, and secondary damage of brain tumor and contributed the elucidation of the cause of death.

Keywords : Autopsy; Glioblastoma; Histopathology; Sudden death.

Background :

The National Cancer Institute, SEER, Bethesda estimated 23,820 new cases diagnosed with brain and other nervous system cancer in 2019, comprise of 1.4% of all new cancer cases. Out of these diagnoses, 17760 resulted in death which comprises2.9% of all cancers death.[12]

Matschkee laborated on the distribution of intracranial neoplasms as the cause of sudden death from the literature review, like that, astrocytoma (20%), glioblastoma (14%), meningioma (14%), and anaplastic astrocytoma (11%) were leading causes.[13] He described the patho-physiological mechanism of sudden death as a result of intracranial neoplasms. The main reason established was the mass effect of the neoplasms which is responsible for any rapid increase in intracranial pressure, be it as a result of acute decompensation of chronic obstructive hydrocephalus resulting from a small brainstem tumor invading or compressing the aqueduct, or fatal bleeding into a hitherto clinically silent glioblastoma to ependymoma.[13] Compensatory mechanisms inevitably become exhausted at some point because any sudden, even tiny increase in intracranial pressure leads to terminal failure of the respiratory centers located in the lower brainstem owing to the herniation phenomenon.[13]

Glioblastoma NOS has an incidence of 2-3 per 100,000 adults per year and accounts for 52% of all primary brain tumors annually. Overall, glioblastoma NOS accounts for about 17% of all tumors of the brain (primary and metastatic). These tumors tend to occur in adults between the ages of 45 and 70. Between 2005 and 2009, the median age for death from cancer of the brain and other areas of the central nervous system was age 64.[14]

Glioblastoma is a primary brain neoplasm comprised of about 12-20% of all intracranial tumors and 50-60% of all astrocytic neoplasms.[15] The World Health Organization (WHO) 2016 classified Glioblastoma: Glioblastoma, IDH wild type, Giant cell glioblastoma, Epithelioid glioblastoma, Glioblastoma IDH mutant, Glioblastoma, NOS.[15] Many researchers shared cases explaining sudden death due to intracranial neoplasms like glioblastoma, oligodendroglioma, medulloblastoma, etc. in various age groups.[16-21]

Case presentation :

A 40-year-old apparently healthy man with clinical history has been unremarkable so far and there were no symptoms or complaints suddenly fell down at his home. Relatives identified

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him unconscious and brought him to Shree Krishna Hospital, Karamsad. The attended doctor found him dead as he was not having a recordable pulse and blood pressure, ECG was also showing flat lines. The patient was declared dead and a medicolegal autopsy was advised. On autopsy examination, the deceased had a moderate build, rigor mortis was in the developing stage and postmortem lividity was faint and not fixed. The cyanosis was present overall on the finger and toe nails. There was no external injury all over the body. No injury was evident on internal examination also. On internal examination of the brain, a growth of 3 x 2.5 x 1.2 cm size was identified on the left side of the cerebral region. On the cut section, the present growth was leathery hard in consistency and showed evidence of hemorrhages at places. The Brain weighed 1450g and showed edema. On examination of the lungs, moderate pulmonary edema was noticed. On examination of other organs, features of polyvisceral stasis were observed.

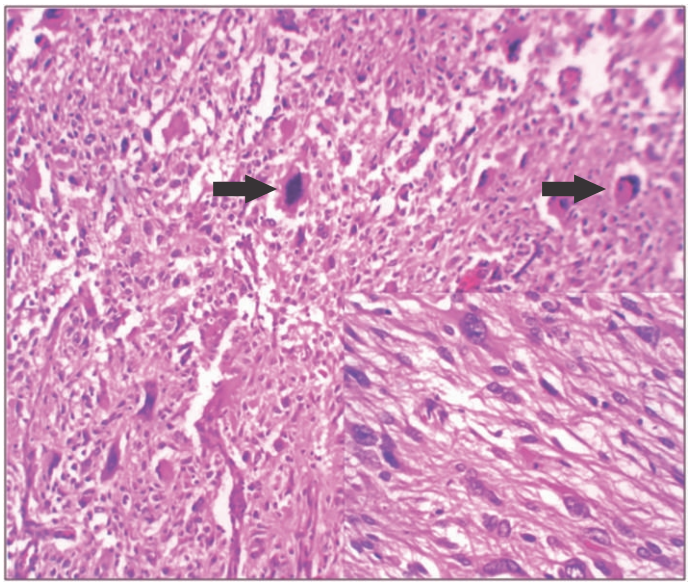

Figure 1:The microphotograph shows presence of highly pleomorphic tumour cells in a fibrillary background (dotted arrows). (H & E stain, 100x) The inset shows the oval to spindled vesicular nuclei with prominent nucleoli, which are severely pleomorphic (solid arrows). (H & E stain, 400X)

Histopathology :

Gross examination revealed a variegated appearance, brownish blackish and greyish white hard necrotic areas. Microscopic sections revealed a tumor with anaplastic astrocytes. The tumor cells were highly pleomorphic, having oval to spindle hyperchromatic nuclei and abundant eosinophilic cytoplasm. Bizzare tumor cells and multinucleated giant cells were reported. Microvascular proliferation and congested blood vessels were noticed. Extensive necrosis and psammomatous calcification were also found. It was concluded as Glioblastoma NOS [WHO grade IV] [Figure 1 &2].

Immuno histochemical examination :

Tumor cells express GFAP and ATRX expression is retained. Ki67 proliferation is 20%. Immunohis-tochemical features were

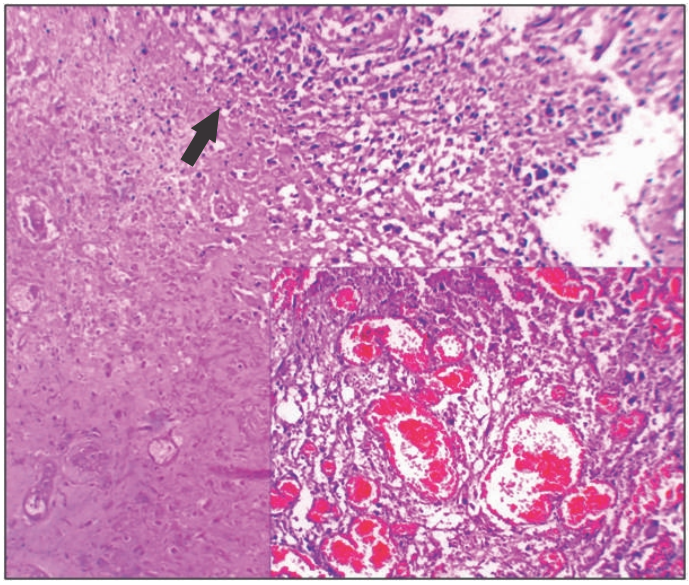

Figure 2: Microphotograph showing areas of necrosis interfacing with viable tumour cells on the right side (H & E stain, 100x).

suggestive of glioblastoma NOS.

Based on the autopsy features, histopathological and immuno-histochemical observations, it was concluded a case of Glioblastoma NOS, in final opinion about the cause of death. This was the first such case detected at the center with regards to medico-legal autopsies.

Conclusion :

Glioblastoma is a highly malignant brain tumor. Autopsy cases of sudden death due to Glioblastoma NOS area handful in the literature. Autopsy findings if supported with histology may be helpful in lineating opinion about the cause of death. This case report is unique for the center and may be useful to build a better understanding of Glioblastoma NOS, especially in autopsy cases [Medicolegal and Pathological].

References :

1. Nofal HK, Abdulmohsen MF , Khamis AH. Incidence and causes of sudden death in a university hospital in eastern Saudi Arabia. Eastern Mediterranean Health Journal; Vol. 17(9). 2011.
2. Di Maio VJM, Di Maio DJ. Forensic pathology, 2nd Ed. London. CRC Press. 2001.
3. International classification of diseases (ICD-10). Geneva, World Health Organization;2005.
4. Sung RJ. Kuo Chi-Tai, Wa Shan-Nan, Lai WT, Luqman N, and Chan NY. Sudden cardiac death syndrome: age, gender, ethnicity, and genetics. Acta CardiologicaSinica; 2008. 24:65-74.
5. Spiliopoulou C et al. Clinical diagnoses and autopsy findings: a retrospective analysis of 252 cases in Greece. Archives of Pathology & Laboratory Medicine. 2005.

DOI:10.5958/0974-0848.2022.00041.0

129:210-214.

6. Morentin B et al. Incidencia y causas de muertesubitaenmenores de 36 anos [Incidence and causes of sudden death in persons less than 36 years of age]. Medicina Clínica; 2001. 116:294-295.
7. Kojima M et al. Sudden death of clinically unknown origin. An overview of post-mortem examinations in Japan. Japanese Journal of Public Health; 1999. 46:563-568.
8. Nashelsky MB, Lawrence CH. Accuracy of the cause of death determination without forensic autopsy examination. American Journal of Forensic Medicine and Pathology; 2003. 24:313-319.
9. Blackwell CC et al. Sudden unexpected nocturnal deaths among Thai immigrant workers in Singapore. The possible role of toxigenic bacteria. International Journal of Legal Medicine; 1994. 106:205-208.
10. Eckart RE et al. Sudden death in young adults: a 25-year review of autopsies in military recruits. Annals of Internal Medicine; 2004. 141(11):829-834.
11. Irene Riezzo et al. Sudden, unexpected death due to glioblastoma: report of three fatal cases and review of the literature. Diagnostic Pathology; 2013. 8:73.
12. The National Cancer Institute, SEER, Bethesda. 2019. Available from: URL: https://seer.cancer.gov /statfacts/html/brain.html.
13. Matschke J. Primary cerebral neoplasm as a cause of sudden, unexpected death. Forensic Pathology Reviews Vol. 2. Edited by Michael Tsokos. 2005: 46-50.
14. Vougiouklakis T, Mitselou A, Agnantis NJ. Sudden death due to primary intracranial neoplasms. A forensic autopsy study. Anticancer Res. 2006. May-Jun; 26(3B):2463-6.
15. Louis, D.N., Perry, A., Reifenberger, G. et al. The 2016 world health organization classification of tumors of the central nervous system: a summary. Acta;Neuropathol:2016. 131:803–820.
16. Matschke J, Tsokos M. Sudden unexpected death due to undiagnosed glioblastoma: report of three cases and review of the literature. Int J Legal Med. 2005;119(5):280–284.
17. Black M, Graham DI. Sudden unexplained death in adults caused by intracranial pathology. J Clin Pathol. 2002;55(1):44–50.
18. Riezzo I, Zamparese R, Neri M, et al. Sudden, unexpected death due to glioblastoma: report of three fatal cases and review of the literature. DiagnPathol. 2013;8:73.
19. Manousaki M, Papadaki H, Papavdi A, et al. Sudden unexpected death from oligodendroglioma: a case report and review of the literature. Am J Forensic Med Pathol. 2011;32(4):336–340.
20. Sutton JT, Cummings PM, Ross GW, Lopes MB. Sudden death of a 7-year-old boy due to undiagnosed glioblastoma. Am J Forensic Med Pathol. 2010;31(3):278–280.
21. Vyshka G, Shaqiri E, Ymaj B. Sudden death due to medulloblastoma. BMJ Case Rep.2010;2010:bcr10.2009. 2378. doi:10.1136/bcr.10.2009.2378.