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Letter to Editor

Anaesthetic Considerations in an Incidental Finding of Leukoariosis

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Leukariosis is an incidental MRI finding that appears as white matter hyperintensities (WMHs) or diffuse white matter changes related to small vessel disease. Patients having severe white matter (WM) disease are more susceptible to intraoperative hypoperfusion, metabolic disturbance, microemboli, the effect, and postoperative hemodynamic perturbations. The effect of anaesthesia in patients with leukoariosis is not commonly known, and there is a paucity of the reported literature.

A 61-year-old, ASA PS grade II, hypertensive male was posted for mastoid exploration. He had a chronic history of profound hearing loss and headache due to otitis media for ten months and patchy-meningitis for five months. The patient was non-smoker and non-alcoholic, known hypertensive since two years, on amlodipine 5 mg OD and had no other co-morbidities. Laboratory investigations were within normal limits. MRI brain suggested pachymeningitis with grade I leukoariosis. CSF culture was done to rule out the cause of pachymeningitis and was negative for any organism. The patient was shifted to the operation theatre, standard monitors were attached, and recorded baseline vital parameters were within normal limits. Preloading was done with 200 ml of ringer lactate, and patient was induced with Inj. Fentanyl (2mcg/kg), Inj. Propofol (1.5mg/kg), and vecuronium (0.1mg/kg). He was intubated by a senior anesthesiologist with 8 mm of an endotracheal tube and fixed at 21 cm and maintained on low flow, 50:50 N2O: O2 and 2% Sevoflurane. Care was taken to avoid hemodynamic changes, hypoxia, hypercarbia and avoid sympathetic stimulation intraoperatively. The surgery lasted for 4 hours and the patient was extubated in a deep plane of anaesthesia and shifted to the post-operative room.

Leukariosis is an incidental MRI finding that appears as white matter hyperintensities (WMHs) or diffuse white matter changes related to small vessel disease. The disease's prevalence is 39-96% in the general population [1]. The pathophysiology of the disease is different depending on the area of involvement. These lesions are commonly seen in elderly patients with hypertension, dementia, diabetes, a cardiac disease with or without prior history of stroke. The periventricular white matter consists of an arterial border zone (watershed) which is formed by a unique arrangement of penetrating arteries and arterioles. This watershed area is susceptible to injury secondary to systemic and focal decrease in cerebral blood flow. Tortuosity and elongation of arteries which occurs with increasing age, adds to the pathogenesis. Patients with leukariosis are usually chronic hypertensive and autoregulatory limits shifted towards the right. Therefore, hypotension occurring rapidly might markedly reduce CBF.

One of the reasons of leukoariosis include repeated episodes of mild hypercapnia or hypotension [2]. Another hypothesis for its pathogenesis is altered CSF circulation and disturbed blood-brain barrier. A study done by Bradley et all in animals found disturbances in CSF circulation play a vital role in periventricular lesions [3]. Leukariosis (LA) is also associated with lacunar stroke, vascular dementia, and Alzheimer's disease. Studies have

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shown that age, hypertension, and serum asymmetric dimethylarginine, stroke are independent risk factors [4].

Patients having severe white matter disease are more susceptible to intraoperative hypo-perfusion, metabolic disturbance, micro-emboli, medication effect, and post-operative hemodynamic perturbations. There are many studies done predicting outcome in patients with leukoariosis. One among them is a retrospective study done by N Morimoto et al in patients undergoing total aortic arch replacement found that leukoariosis and hippocampal atrophy are significant independent factors for adverse neurologic outcomes [5].

The effect of anaesthesia in patients with leukoariosis (LA) is not commonly known. Preanesthetic checkup should be done to rule out the risk factors associated with LA such as diabetes, hypertension, stroke, cardiac diseases, and cognitive disorders. Based on the understanding of the pathophysiology of LA and different clinical studies, due care is to be taken to avoid hypotension and hypoxia during the induction of the patient. Since mild hypercarbia is also one of the causes, hypoventilation should be avoided and ETCO2 should be maintained at normal levels during the intraoperative period.

In our case, we preloaded the patient to avoid hypotension. Adequate preoxygenation of the patient was done to avoid hypoxia during intubation and titrated dose of inducing agent were used to avoid any hypotension. Post-operative neurological adverse effects of surgery and anesthesia can be high in these patients due to the effects of anesthetic drugs on cerebral blood flow and cerebral autoregulation. These could be delirium, post-operative cognitive decline, and stroke. Therefore, examination in detail of neural functions should be done in the preoperative period and should not be neglected.

Practicing anesthesiologists should be familiar with the incidence, risk factors, outcomes, prevention, and management of important neurological complications due to leukoaraiosis in order to early recognition and improve care in the perioperative period. Before any preventive measures or therapeutic interventions, understanding of the pathogenesis is essential and close attention to variables that impact the post-operative outcome should be given.

In conclusion, the effect on neurological outcome due to leukoaraiosis in the post-operative period is important clinically therefore assessment of risk factor during preoperative evaluation is imperative and all factors to maintain adequate depth of anesthesia avoiding hypotension, hypoxia, hypercarbia should be taken.

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