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Transient Cortical Blindness and Deafness After Cardiac Catheterization: A Case Report

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ABSTRACT

Cardiac catheterization is very common diagnostic procedure and an extremely rare complication is the onset of transient cortical blindness and cortical deafness following the administration of iodine-based contrast for the percutaneous coronary angiography. This case study presents a 59-year-old male who developed iohexol induced transient cortical deafness along with cortical blindness approximately 30 minutes after an uncomplicated percutaneous coronary intervention. Neurological Imaging ruled out acute pathology and the condition fully resolved within 24-48 hours with supportive intervention. Iohexol related complication, could be due to an allergic response or to its toxicity, as the administration of contrast disrupts the blood-brain barrier and causes transient cortical blindness, it has also been correlated with short-term deafness, which is supposed to be ion exchange across the blood-labyrinth barrier leading to damage of the inner ear and thus cause transient deafness. This rare dual sensory complication is the reason why the adverse events associated with contrast agents should be raised awareness and to understand the mechanism of this phenomenon for managing such a rare complication.

Keywords: *Blindness, Contrast-Induced, Deafness, Cardiac Catheterization, Iodine-Based Contrast, Iohexol*

Introduction

Coronary angiography is an effective diagnostic procedure with a minimal risk of serious adverse effects (acute heart failure, cerebrovascular accidents, and episodes of angina) and an overall mortality rate is under 0.2% (Lawton *et al*., 2022). One of the rare complications of coronary angiography is contrast-induced visual loss (Sadiq *et al*., 2020). We have presented a rare case of temporary cortical blindness along with transient cortical deafness during percutaneous coronary angiography. It has followed by the

investigation of prior cases of short-term cortical blindness and deafness as contrast-induced complications in angiographic procedures (Ullah *et al*., 2023). To the best of our knowledge, no cases have been published on this complication in which patient underwent percutaneous coronary angiography and later developed contrast induced transient cortical blindness along with transient cortical deafness (Terlecki *et al*., 2013).

Case Presentation

A 59-year-old male, presented with shortness of breath (NYHA class II-III), chest pain and fatigue during strenuous physical activity in the Outpatient Unit and immediately admitted with the suspicion of unstable angina.

The patient has a history of hypertension and diabetes mellitus for 26 years. He also had a history of seasonal asthma and was allergic to dust and smoke. His current medications included Acetylsalicylic acid 75mg, Bisoprolol 5mg and Salmeterol inhaler. There was no significant family history of cardiovascular disease, and the patient had never undergone coronary angiography before. Baseline investigations reported to be within normal ranges prior to the procedure (Table 1).

Table 1: Laboratory test results showing mild anemia.

Lab Test	Value			Normal Range
	Pre Cardiac Catheterization	Post Cardiac Catheterization		
		1ST Day	2nd Day	
Hemoglobin (g/dL)	11.6	12.6	12.2	13.0 – 17.0 g/dL
Hematocrit (%)	34.5	37.8	36.1	41 - 53 %
RCC (million/µL)	4.48	4.95	4.76	4.3 – 5.9 millions/µL
MCV (fL)	77.0	76.4	75.9	80 – 100 fL
MCH (pg)	25.9	25.6	25.7	27 – 33 pg
MCHC (g/dL)	33.7	33.5	33.9	32 – 36 g/dL
TLC (x 1000/µL)	13.9	14.8	14.6	4 – 11 x 1000/µL
Neutrophils (%)	62	85	89	40 – 70 %
Lymphocytes (%)	24	12	06	20 – 40 %
Eosinophils (%)	04	01	01	1 – 6 %
Monocytes (%)	10	02	04	2 – 8 %
Platelets (x 1000/µL)	340	398	319	150 – 450 x 1000/µL
RDW (%)	18.5	19.7	18.6	11.5 – 14.5 %
Urea (mg/dL)	26	32	40	15 – 40 mg/dL
Creatinine (mg/dL)	1.0	1.1	1.1	0.7 – 1.3 mg/dL
Sodium (mmol/L)	139	135	132	135 – 145 mmol/L
Potassium (mmol/L)	4.2	4.6	4.9	3.5 – 5.0 mmol/L
Chloride (mmol/L)	103	98	100	98 – 106 mmol/L
Bicarbonate (mmol/L)	28	26	25	24 – 31 mmol/L

RBC: Red cell count; MCV: Mean cell volume; MCH: Mean cell hemoglobin; MCHC: Mean cell hemoglobin concentration; TLC: Total leukocyte count; RDW: Red cell distribution width

Later patient undergoes diagnostic percutaneous coronary angiography using 130ml of Iohexol non-ionic, low osmolar iodinated contrast agent. Coronary angiography revealed critical stenosis in proximal to mid segment of left circumflex artery (LCX). Percutaneous coronary intervention (PCI) was subsequently performed through right radial access, with the placement of Drug eluting stent (DES) of 3.0 x 23mm to LCX (Fig. 1). Procedure was concluded without any hemodynamic compromise.

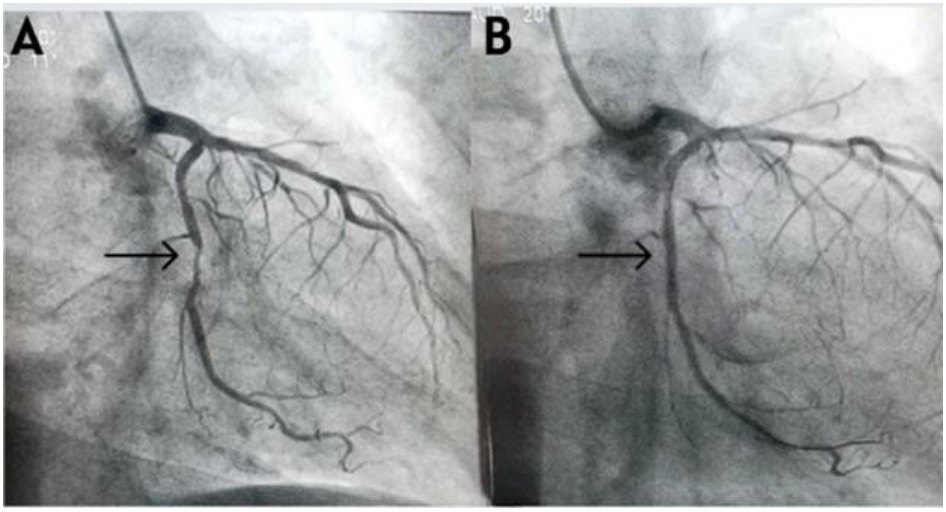

Figure 1: (A) Before Percutaneous Coronary Intervention, (B) After Percutaneous Coronary Intervention.

As part of our thorough PCI protocol, the patient received local anesthesia within the catheterization lab using 2% lidocaine. Throughout the procedure, two doses of heparin (5,000 IU each) were given, with no complications reported.

After half an hour in the CCU following the PCI procedure, the patient experienced a sudden and total bilateral vision loss followed by bilateral hearing loss. This was accompanied by confusion and disorientation to time, place and person, including raised blood pressure 175/80mmHg, While the rest of the vitals remained in normal limits (blood pressure 132/89mmHg, heart rate 88b/min, SpO2 98% on room air) urgent neurological evaluation was performed, and a brain CT scan showed no evidence of acute intracranial hemorrhage or infarction (Fig. 2). Ophthalmologist and otolaryngologist advised to observe patient for 24-48 hours before any intervention. Both the clinical examination and laboratory findings were unremarkable (Table 1). He was treated with intravenous antihistamine, dexamethasone, hydralazine, amlodipine along with intravenous fluids and the symptoms gradually improved. In first 24 hours, the patient had reported slight improvement in vision as well as hearing and by 48 hours both vision and hearing had fully recovered.

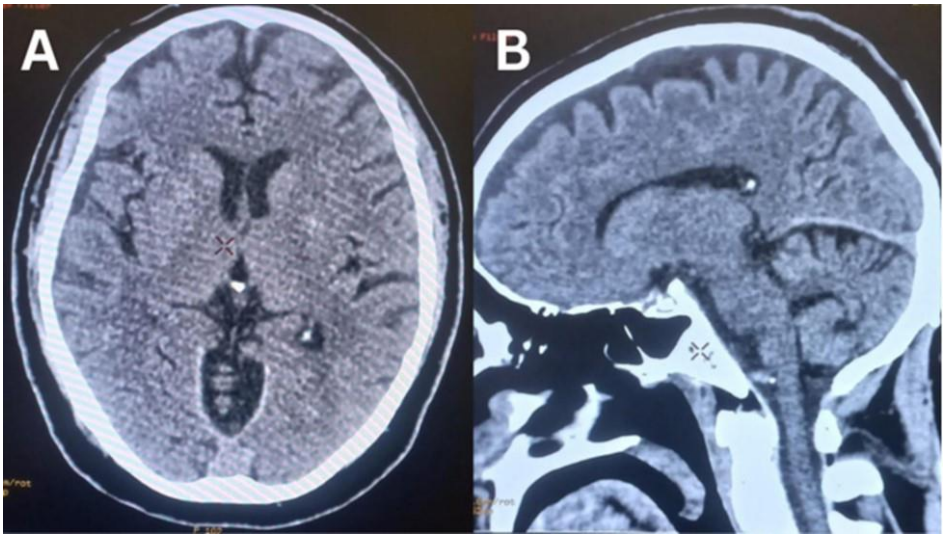

Figure 2: CT Scan Brain (A) Axial View, (B) Sagittal View.

The patient was diagnosed with contrast-induced transient visual and hearing loss, a rare complication of contrast media administration during cardiac catheterization. He was discharged on the third day and was asked to follow-up. On follow-up visits, patient was vitally and clinically stable.

Discussion

Iohexol belongs to the class of nonionic, low-osmolality contrast agents which are used in different kinds of diagnostic imaging, such as coronary angiography (Sauer *et al*., 2022). Percutaneous coronary angiography is an effective diagnostic procedure with a minimal risk of serious adverse effects (Rudziński *et al*., 2022). While in rare instances, iohexol has been correlated with short-term deafness, which is supposed to be ion exchange across the blood-labyrinth barrier leading to damage of the inner ear (Nyberg *et al*., 2019). The cochlear-blood barrier is a protective barrier between the inner ear and the bloodstream just like the Blood-brain barrier. It closely monitors the chemical composition of internal-ear fluids and ensures that the inner ear functions normally. Contrast agents administered for medical imaging exams like the coronary angiography may contribute to the disruption of the BBB and allow leakage of contrast dye into the brain parenchyma (Khan *et al*., 2014). This possibly leads to the hyperpolarization of the neurons, which in turn increases the activation potential threshold and inhibits the electrical activity throughout the affected brain (Maclean *et al*., 2025).

In case of iohexol-induced deafness, scientists assume that the contrast agent exchanges ion across the blood-labyrinth barrier and disturbs the normal functioning of the inner ear. This may cause cochlear

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ischemia which is a process of the reduction in the flow of the blood to the cochlea thus damage to the hair cells and nerve fibers supporting the auditory function occur (Peixoto Pinheiro *et al*., 2021).

The detailed manner in which iohexol crosses the blood-labyrinth barrier is not properly known (Ashwin Kumar *et al*., 2021). Despite that, it is believed that the contrast agent may initiate osmotic disruption of the membrane and provoke release of the contrast media into the inner ear. High levels of reactive oxygen species are generated as a consequence of this which may lead to damage of the hair cells and nerve fibers that transmit hearing (Sendeski, 2011).

The information regarding iohexol-induced transient hearing loss is rare. While in a single case report on iopamidol-induced transient deafness, the mechanism of the event leading to cochlear ischemia due to the contrast agent was believed to be cochlear ischemia that was caused by the contrast agent (Sadiq *et al*., 2020; Maclean *et al*., 2025). However, the case report of the patients who has experienced sudden hearing loss and tinnitus associated with the use of an iodine contrast agent (iohexol) also suggested that there may be another mechanism by which steroid treatment can protect or recuperate hearing cells up to three months after the damage areas. Additionally, if there is damage to the occipital lobes that are responsible for visual processing may cause transient cortical blindness (Singh and Kumar Irugu, 2020).

Immunological mechanisms were also believed to be responsible for the pathophysiology and incidence of cortical blindness due to radiocontrast (Oktaviono *et al*., 2021). Smartly, the presence of hyperosmolar solutions can increase the penetration capability of the blood-brain barrier specifically in the occipital area, and chronic hypertension patients may be at a more increased risk of increased permeability of the blood-brain barrier. After the contrast agent is excreted, the situation will return to normal as the protective function of the blood-brain barrier resumes (He *et al*., 2018; Kadry *et al*., 2020).

A computed tomography examination can help determine the existence of occipital gyral and subarachnoid hyperdensity in patients who experienced contrast related cortical deafness or vision loss after percutaneous coronary angiography. This imaging method can detect bilateral symmetry of subarachnoid and gyral hyperdensity within both occipital lobes, indicating temporary cortical blindness (Liao *et al*., 2013). Furthermore, the CT scan may assist in determining various potential causes of temporary visual loss, such as hemorrhage and embolic stroke, particularly following intra-arterial operations. However, the majority of contrast-induced blindness and deafness showed normal scan and thus it is a convenient tool to detect ischemic changes occurred due to this condition (Liao *et al*., 2013; Almasood *et al*., 2022).

The administration of glucocorticoids, IV methylprednisolone, may reduce symptoms of allergic reaction to iodinated contrast responses and prevent additional allergic reactions in the period of time following intervention (Schrijvers *et al*., 2019).

The current case is consistent with the current literature details transient cortical blindness and, independently, transient deafness as infrequent complications of contrast administration, and the mechanisms hypothesized to cause these phenomena, including osmotic disruption of the blood-brain and blood-labyrinth barrier (Khan *et al*., 2014; Sendeski, 2011; He *et al*., 2018). In addition, the fact that the patient recovered within a short span of just 48 hours is an indicator of the transient nature of this condition that has been reported before (He *et al*., 2018; Kadry *et al*., 2020). Nevertheless, this case makes a substantial contribution to the existing body of literature as it records the first case of the simultaneous occurrence of the two complications in the same patient after having undergone cardiac catheterization. Such a distinct description implies that the pathophysiological damage of the Iohexol could be in some rare cases more widespread than previously realized, concomitantly involving the auditory and visual cortical pathways. It points out the importance of clinicians understanding that such complications do not occur independently and may co-exist.

Conclusion

The case study depicts an unusual but remarkable incidence of short-term cortical blindness and deafness after administration of iohexol contrast agent percutaneous coronary angiography. In order to guarantee the safety of patients and post-intervention recovery, it is essential to fully understand the physiological mechanisms underlying these sensory defects and to rapidly manage problems along with providing patient with reassurance. In order to reduce any potential adverse reactions linked to contrast agents, more study and close monitoring of patients are recommended.

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Authors Contributions

Concept and Design: Syed F Sarmad, Javeria Javed

Acquisition, Analysis, or Interpretation of Data: Khaola T Qaiser, Khawar Saleem

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Critical Review of The Manuscript for Important Intellectual Content: Khaola T Qaiser, Javeria Javed

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

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