

# Journal Pre-proof

COVID 19 and Intra cerebral hemorrhage: Causative or Coincidental

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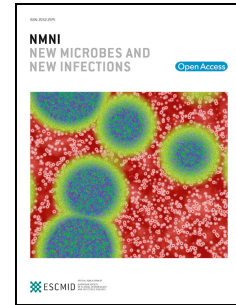
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**Manuscript type: First Clinical Case in Emerging Country**

**Title: COVID 19 and Intra cerebral hemorrhage: Causative or Coincidental**

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**Abstract:** Pneumonia appears to be the most manifestation of COVID 19, but some extra-pulmonary involvement such as gastrointestinal, cardiac and renal has been reported. According to limited clinical data about the virus behavior up to now, specially extra-pulmonary symptoms, we should be aware on possibility of initial cerebrovascular manifestations of COVID19.

**Text:** Pneumonia appears to be the most manifestation of new COVID 19, but some extra-pulmonary involvement such as gastrointestinal, cardiac and renal has been reported [1,2,3]. The most common symptoms described as fever, cough, myalgia, fatigue, shortness of breath, moreover; diarrhea, chest pain, confusion, nausea-vomiting, headache, hemoptysis and hyposmia were observed [4]. We present a 79 year old man with history of fever and cough from 3 days ago referred to emergency room with acute loss of consciousness. At the admission he was febrile ( T=38.60C), tachycard (HR=115), tachypneic ( RR=22) and Blood Pressure was 140/65 , Po2=51.8, PCO2=27.9 and O2 Sat=86.6%. There was no history of Hypertension and anticoagulation therapy. In addition to loss of consciousness (GCS=7) and bilateral extensor plantar reflexes, physical exam revealed coarse rales in left lower lobe of lung. Paraclinical findings showed lymphopenia (590 cell/mm<sup>2</sup> ), ESR=85, CRP=+1, Cr=1.4, Plt: 210,000, PT=12 sec, INR=1, PTT=64 sec, normal liver function and other routine lab tests. Lung CT (Figure1) showed ground glass opacity in left lower lobe and Brain CT (Figure 1) showed massive Intra Cerebral Hemorrhage(ICH) in right hemisphere accompanied with Intra ventricular and subarachnoid hemorrhage. Real Time-Polymerase Chain Reaction of oropharyngeal swab confirmed COVID19 infection.

Know, the question that arises is this: according to recent epidemy in our region (Mazandaran province of Iran) COVID 19 infection is causative or coincidental event with ICH? The novel coronavirus has been shown to use the Angiotensin Converting Enzyme (ACE) II receptor for cell entry [4]. ACE II highly express in lung alveolar type 2 cells and epithelial cells of gastrointestinal system [1,4]. Angiotensin II receptors also express in circumventricular organs and in cerebrovascular endothelial cells, that have a role in multiple function regulation in brain include the regulation of hormone formation and sympathoadrenal system, water and sodium intake, vascular autoregulation and cerebral blood flow [5]. Angotensin II is vasoconstrictor and have a pro-inflammatory effect[6].Thus, It is reasonable to hypothesize that brain ACE II could be involved in COVID19 infection and It's dysfunction leading to autoregulation disruption and high blood pressure spikes and result of arterial wall rupture.

Another question is, how virus invade to central nervous system(CNS)? Anecdotal report of specialist in Iran consistent with hypo or anosmia is very common specially in early stage of infection, it is possible to direct invade of CNS through olfactory receptors of cranial nerve I in the nasal cavity cell membrane. Although these are only a theory, in order to limited clinical data about the virus behavior up to now, specially extra-pulmonary symptoms, we should be aware on possibility of initial cerebrovascular manifestations of COVID19.

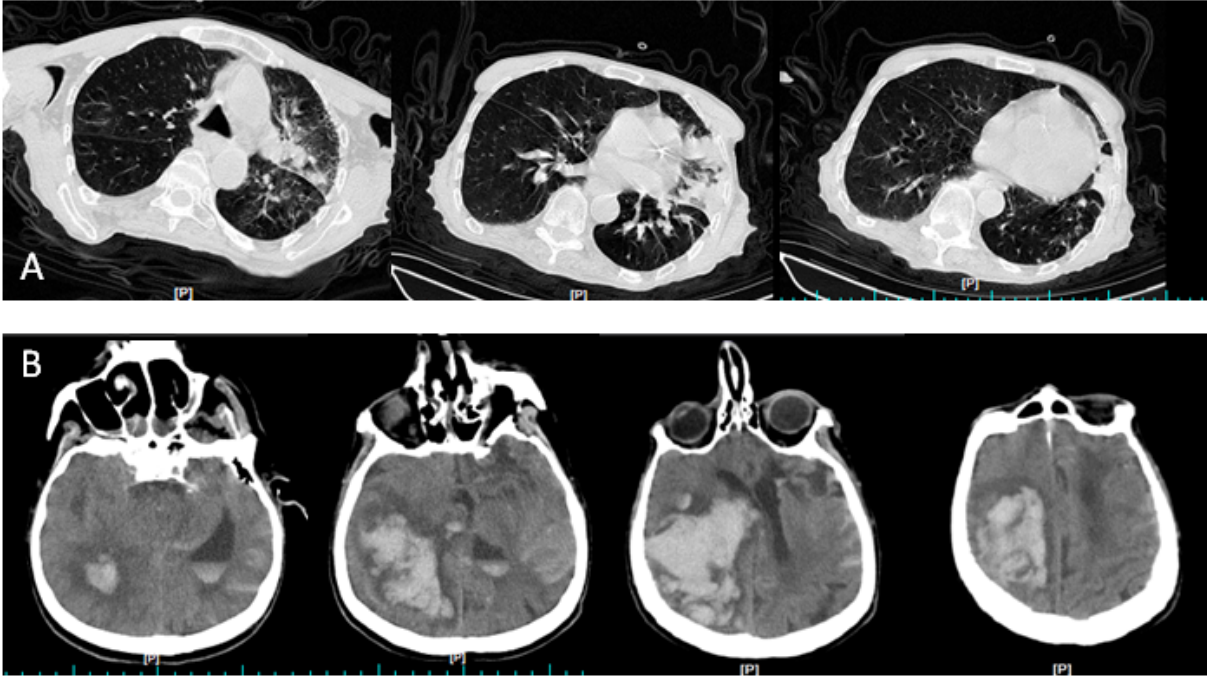
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FIG 1. Spiral Lung CT (A) showing ground glass opacity in lateral and anteromedial segment of left inferior lobe and Brain CT (B) showing massive Intra Cerebral Hemorrhage in right hemisphere accompanied with Intra Ventricular and Subarachnoid hemorrhage

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