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Case Report

Is Fahr's disease a saviour for intracranial hypertensive bleeds? - A review

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ABSTRACT

Fahr's disease (FD) is a rare disorder characterised by abnormal deposition of calcium in different parts of brain especially in basal ganglia, thalamus and dentate nucleus. Association of FD with ischemic stroke has been described in past but very less literature available showing association of FD with haemorrhagic stroke. We present here a case of 70 years old hypertensive male patient suffering from FD with left thalamic acute haemorrhage. Although basal ganglia is a common site for hypertensive bleed, but in this hypertensive patient, basal ganglia was spared. We assume that this could be due to presence of calcification within vessel walls of basal ganglia that strengthen the walls and hence act as a saviour for basal ganglia bleed in this case.

1. Introduction

Fahr's disease (FD) is characterised by the abnormal calcium deposition in movement controlling areas of brain typically including basal ganglia, thalamus and dentate nucleus. Other areas like cerebral cortex, cerebellum, subcortical white matter and hippocampus may also be involved.[1] The prevalence of this rare inherited or sporadic neurological disorder is around 1/1000000.[2] The cases of FD usually present with extra pyramidal symptoms which may be added upon by dementia, speech difficulty, cerebellar dysfunction and neuropsychiatric symptoms.[3]

The literature has limited reference of association of FD with haemorrhagic stroke. The authors have made an attempt to highlight the factors which could be related to the intracerebral haemorrhagic episode in FD.

2. Case Report

A 70 years old hypertensive male patient reported with one day's complaint of headache, loss of sensation and difficulty in maintaining a balance in erect posture. He revealed that he had also problems of memory loss, movement dysfunction and progressive weakness of bilateral upper and lower limbs since last 2 years.

Computerised Tomography scan (CT) showed a hyper dense area (CTHU-60-80) in left thalamic region with mild perifocal edema, suggestive of left thalamic acute haemorrhage along with diffuse age related cerebral atrophy. CT also revealed bilaterally symmetrical calcification in head and body of caudate nucleus, globus pallidus, anterior aspect of putamen, bilateral dentate nuclei and bilateral para-hippocampal locations (Figures 1 and 2). Few foci of calcifications were also noted along falx cerebri, cortical and subcortical areas of the brain and bilateral centrum semiovale. Bilateral thalami were spared of any calcification.

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Table 1: FD associated with Cerebro-Vascular diseases (CVDs) - Review of literature

Author	Year	Gender, age	Associated CVDs
Present study	2020	Male, 70 y	Left thalamic bleed
Baek Hee [4]	2019	Female, 65 y	Right parieto-occipatal haemorrhage
Sgulo [5]	2018	69 and 72 y females (2 cases)	Basal ganglia hemorrhage and left pericallosal aneurysm respectively
Yang [6]	2016	Male, 36y	Ischemic stroke
Eroglu [7]	2016	Female, 42y	Multiple intracranial aneurysms
Al-Jehani [8]	2012	Female, 54y	Ruptured right posteriorcommunicating aneurysm
Swami and Kar [9]	2011	Male, 45 y	Right thalamic bleed
Asensio Moreno [10]	2008	Male, 71y	TIA
Younes-Mhenni [11]	2002	Female, 39y	Stroke-like episodes
Drouet [12]	2000	Female, 52y	Stroke-like episodes
Bartecki [13]	1979	Male, 39y	TIA

The biochemical profile of the patient showed normal serum calcium, vitamin D3, phosphate and parathyroid levels. The complete blood count, liver, renal, viral markers, diabetes and thyroid panels showed no significant abnormality. The patient was hypertensive since the last 10 years and was on irregular medications.

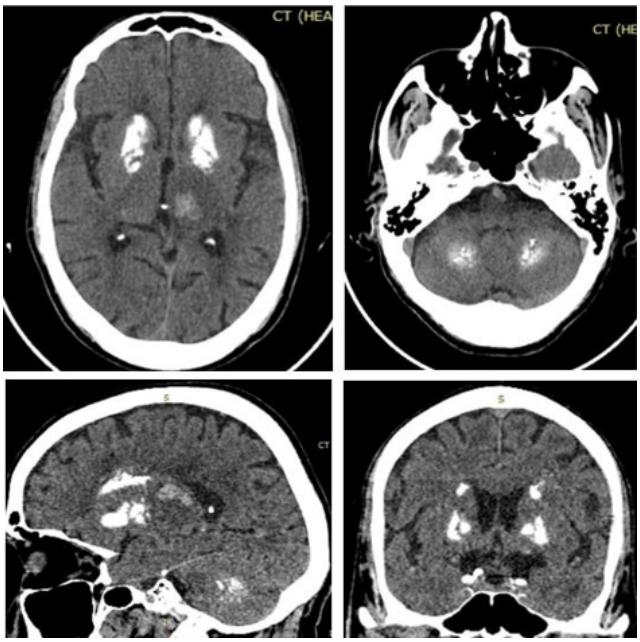

Fig. 1: Axial,saggital and coronal section to show areas involves in Fahr's disease. Note bilateral thalami are spared of calcification.

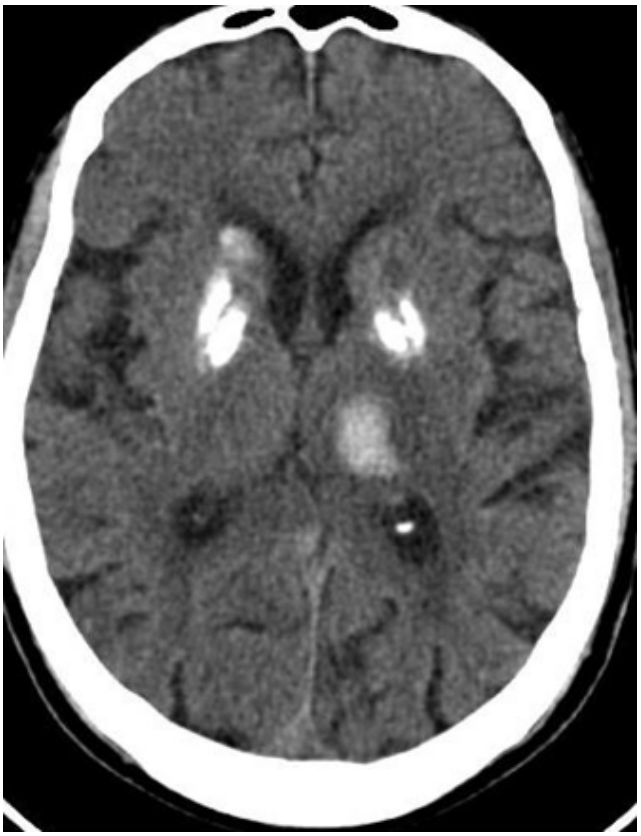

Fig. 2: Left thalamic haemorrhage.

3. Discussion

The modified diagnostic criteria for FD was derived from Moskowitz et al. in 1971, Ellie et al. 1989, Manyam 2005 [14–16] and is presented below:

1. Bilateral calcification in basal ganglia on imaging. Other regions of the brain may also be involved.
2. Progressive neurologic dysfunction (movement disorder and/or neuropsychiatric manifestations). Typically seen in the fourth or fifth decade although similar features may also present in childhood.
3. Absence of biochemical disturbance and somatic features which are suggestive of a mitochondrial or metabolic disease or other systemic disorder.
4. Absence of a traumatic or infectious cause.

5. Family history of autosomal dominant inheritance patterns.

This diagnostic Criteria is useful to differentiate Fahr's disease from Fahr's syndrome (FS). Secondary causes attribute to the features that constitute FS. Considering the etiology, FD can be autosomal dominant, Familial or Sporadic.

In our case the above 4 diagnostic criteria were fulfilled and was indicative of sporadic catagory of FD. Normal blood, urine, and viral markers ruled out the possibility of infective aetiology. The biochemical profile of the patient showed normal serum calcium, vitamin D3, phosphate and parathyroid levels thus ruling out metabolic causes of calcification like hypoparathyroidism, pseudo-hypoparathyroidism, pseudo-pseudo hypoparathyroidism and hyperparathyroidism.There was no history of trauma so traumatic cause of calcification was eliminated.

According to Elshimali et al., microscopic and biochemical analysis of brain deposits in Fahr's disease reveals that the stroma contains mainly calcium and protein without collagen or mucopolysaccharides. These deposits occur in vessel walls of arterioles, capillaries, veins, and in the perivascular spaces. The calcium deposits are generally symmetrical and may be seen in the walls of small and medium sized vessels that could have resulted from inflammatory processes in the vessels.[17] Saleem et al. in their study indicated that calcification usually develops within the wall of vessel and in the perivascular space, eventually extending to neuron at the molecular level. Progressive basal ganglia mineralization tends to compress the vessel lumen, thus initiating a cycle of impaired blood flow, neural tissue injury and mineral deposition.[18] These two studies mainly emphasized on the etiopathogenesis of ischemic strokes with vascular calcification as the main culprit but none of these showed relation of vascular calcification with haemorrhagic stroke.

Baek Hee et al. In his report suggested that calcification with in the vessel might strengthen the vessel wall and thus decreased the chances of spontaneous bleed. On histopathological study of FD, calcium deposits can be seen in the walls of the intracerebral vessels that may have resulted from the ongoing inflammatory processes. However, among the various reported cases, only a few were associated with haemorrhagic strokes.[4] We believe the main reason behind this could be the presence of calcification within the vessels which strengthen the wall and decreased chances of rupture.

The Al-Jehani et al. presented a case of FD with an aneurysmal subarachnoid hemorrhage.[8] The study of Swami and Kar reported a case of ICH in the right thalamus and midbrain with hypertension and pseudo-hypoparathyroidism.[9] Recently , Sgulo et al. also reported two cases of basal ganglia ICH, and a ruptured aneurysm of the peri callosal artery in FD.[5] All these studies do add to the literature but the clear Patho-physiology was not described. Following review of literature on the subject regarding association of FD with cerebrovascular disease is rather rare and is summarised in Table 1.

According to previous studies, the basal ganglia (55%) is the most common site of spontaneous bleeding followed by the thalamus (26%), cerebral hemispheres (11%), brain stem (8%), and the cerebellum (7%).[19] Hypertension is by far the most common attributable risk factor; it accelerates age-related "wear and tear" of cerebral arterioles at branch points.[20] Nontraumatic bleeding into the brain parenchyma results from rupture of small penetrating arteries.

Lopes-Villega reported that out of 18 Fahr's syndrome patients, Lesions were reported to be located in Globus Pallidus in 16(88.9%), putamen in 3(16.7%), caudate in 2(11%), thalamus in 1(5.6%) and cerebellar dentate nucleus in 1(5.6%)[21] and it was found that basal ganglia remains the most common site of calcification in FD followed by other areas of brain. Although there were several reports on FD, only a few of them were presented with ICH, which suggests that calcification does not increase the risk of ICH by itself. Conversily, calcification may be helpful in halting ICH by strengthening the tissues or vessels.[4]

Our patient was diagnosed with hypertension several years back which probably was the reason of haemorrhage in thalamic region. Considering the fact that, calcification was absent in thalamus region and hence the effects of hypertension appeared to be more pronounced in that region in comparison to the areas of basal ganglia where calcification was evident. In spite of the fact that basal ganglia are the most common site for hypertensive bleed, it was spared in this case probably due to the presence of calcification with in the vessel wall of basal ganglia region. And hence the symptoms were not that severe which could had been in case if basal ganglia were involved.

4. Conclusion

This case of FD showed hypertensive bleed in thalamic region, while the basal ganglia was spared which could be due the presence of calcification with in the vessels of basal ganglia. Thus, presence of FD could be considered as a saviour for basal ganglia bleed in this case. However, due to presence of limited literature, it is still too early to reach any conclusion regarding the relationship between the occurrence of vascular calcification and a decrease risk of hypertensive bleed. More study is required to establish the distribution pattern of hypertensive bleed in association with FD.

5. Conflict of Interest

The authors declare that there are no conflicts of interest in this paper.

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None.

References

1. Ahad MA, Bala C, Karim S. Fahr's syndrome. *Bangladesh Med J Khulna*. 2013;45(1-2):33–5.
2. Manyam BV, Walters AS, Narla KR. Bilateral striopallidodentate calcinosis: clinical characteristics of patients seen in a registry. *Mov Disord*. 2001;16(2):258–64.
3. Chiu H, Lam L, Shum P, Li K. Idiopathic calcification of the basal ganglia. *Postgraduate Med J*. 1993;69(807):68–70.
4. Jang BH, Son SW, Kim CR. Fahr's Disease With Intracerebral Hemorrhage at the Uncommon Location: A Case Report. *Ann Rehabil Med*. 2019;43(2):230–3. doi:10.5535/arm.2019.43.2.230.
5. Sgulò FG, Nuzzo GD, Notaris MD, Seneca V, Catapano G. Cerebrovascular disorders and Fahr's disease: Report of two cases and literature review. *J Clin Neurosci*. 2018;50:163–4. doi:10.1016/j.jocn.2018.01.002.
6. Yang CS, Lo CP, Wu MC. WuIschemic stroke in a young patient with Fahr's disease: a case report. *BMC Neurol*. 2016;16:33. doi:10.1186/s12883-016-0557-8.
7. Eroglu U, Kahilogullari G, Demirel A, Arat A, Unlu A. Fahr's Syndrome Associated with Multiple Intracranial Aneurysms: A Case Report. *Turk Neurosurg*. 2016;26(4):643–5. doi:10.5137/1019-5149.JTN.8574-13.0.
8. Al-Jehani H, Ajlan A, Sinclair D. Fahr's Disease Presenting with Aneurysmal Subarachnoid Hemorrhage. *J Clin Imaging Sci*. 2012;2:27. doi:10.4103/2156-7514.96542.
9. Swami A, Kar G. Intracranial hemorrhage revealing pseudohypoparathyroidism as a cause of fahr syndrome. *Case Rep Neurol Med*. 2011;p. 407567. doi:10.1155/2011/407567.
10. Moreno CA, Jiménez JA, Bodas OA, Calv MO, Cano RP. Transient ischemic attack associated with a calcinosis cerebri syndrome. *Med Interna*. 2008;25(1):33–5. doi:10.4321/s0212-71992008000100009.
11. Younes-Mhenni S, Thobois S, Streichenberger N. Encéphalomyopathie mitochondriale de type Melas associée à un syndrome de Fahr avec calcifications cérébelleuses. *La Revue de Méd Interne*. 2002;23(12):1027–9. doi:10.1016/S0248-8663(02)00730-0.
12. Drouet A, Guilloton L, Godinot C. Diabète mitochondrial compliqué ou associé à un syndrome «MELAS»? *Rev Neurol*. 2000;156(10):892–5.
13. Bartecki BF, J. KamienowskiTransient focal ischemia in Fahr's disease. *Neurol Neurochir Pol*. 1979;13(4):443–7.
14. Ellie E, Julien J, Ferrer X. Familial idiopathic striopallidodentate calcifications. *Neurology*. 1989;39(3):381–5.
15. Moskowitz MA, Winickoff RN, Heinz ER. Familial calcification of the basal ganglions: a metabolic and genetic study. *N Engl J Med*. 1971;285(2):72–7.
16. Manyam BV. What is and what is not 'Fahr's disease. *Park Relat Disord*. 2005;11(2):73–80.
17. Elshimali YI. The value of differential diagnosis of Fahr's disease by radiology. *Internet J Radiol*. 2005;4(1).
18. Saleem S, Aslam HM, Anwar M. Fahr's syndrome: literature review of current evidence. *Orphanet J Rare Dis*. 2013;8:156. doi:10.1186/1750-1172-8-156.
19. Zafar A, Khan FS. Clinical and radiological features of intracerebral haemorrhage in hypertensive patients. *J Pak Med Assoc*. 2008;58(7):356–8.
20. Aguilar MI, Brott TG. Update in intracerebral hemorrhage. *Neurohospitalist*. 2011;1(3):148–59. doi:10.1177/1941875211409050.
21. Fisher CM. Pathological observations in hypertensive cerebral hemorrhage. *J Neuropathol Exp Neurol*. 1971;30(3):536–50.

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