

UNRUPTURED INTRACRANIAL ANEURYSM AND FIRST EPISODE PSYCHOSIS: THE MYSTERY WAS FINALLY SOLVED

Tongjei E. Tungaraza^{1,3} & Ranbir Singh^{2,3}

¹Choice Lifestyles LTD, Beverley House, City Road Birmingham, UK

²Bedford East CMHT, Bedford, UK

³Penn Hospital, Wolverhampton, UK

SUMMARY

Incidental findings on Head MRI and CT scans are common in the general population as well as in patients presenting with first episode of psychosis (FEP). Though unruptured intracranial aneurysms (UICAs) are among the incidental findings, they are rare in those under the age of 30. We present a case of a young man (28) who presented with FEP and unruptured intracranial aneurysm. The implications to treating physicians are discussed given the rareness of the two to be found together in the given age group. Following physical examination and several physical tests including both CT and MRI scans, it was established that in addition to psychosis, the young man had an unruptured intracranial aneurysm on the right anterior communication artery. The psychosis continued despite successful treatment of the aneurysm. It was concluded that the aneurysm was an incidental finding. UICs under the age of 30 in patients presenting with FEP are more likely to be coincidental findings rather than the underlying cause of psychosis. However, clinicians need to remain vigilant by conducting physical examination including neurological examination for patients presenting with FEP. The need for brain CT or MRI scan should be informed by clinical presentation and the findings on physical examination.

Key words: unruptured intracranial aneurysm (UICA) - MRI scan - CT scan - psychosis - subarachnoid haemorrhage - first episode psychosis (FEP)

* * * * *

BACKGROUND

About 0.2-8% of asymptomatic unruptured intracranial aneurysm (UIAs) are detected in health individuals based on imaging and autopsy (Katzman 1999, Vlaskovits 2011, Jeon 2011, Ghods 2012). A recent meta-analysis (Vlaskovits 2011) comprising of 68 studies with around 94,900 participants with mean age of 50 and 50% being men observed the prevalence of UIAs to be around 3.2%.

Risk factors for developing intracranial aneurysms include smoking, alcohol misuse, hypertension, head trauma, polycystic kidney disease and family history of aneurysm. Others include female gender and being over 50 years of age (Vlaskovits 2011, Wolfe 2006). Cerebral aneurysms occur more commonly in fourth to sixth decade of life and are rare in the first three decades though they may occur at any age. They are more common in women than in men (Vlaskovits 2011, Wolfe 2006).

A common location of cerebral aneurysms is on the arteries at the base of the brain, known as the Circle of Willis. A study done in US, looking at the location of aneurysm by gender concluded that among women 54% of aneurysms were located along the ICA branch of arteries-internal carotid artery, ophthalmic artery, posterior communicating and anterior collicular artery while for men (29% against 15% in women) aneurysms were commonly found on the ACA area i.e. anterior cerebral artery, anterior communicating and pericallosal artery (Ghods 2012). Though some studies have looked at CT or MRI findings in patients with first episode of psychosis (FEP) there have been no systematic studies

to examine the role of UICAs in psychosis. We present a case of a young man with unruptured intracranial aneurysm who presented with first episode of psychosis.

CASE HISTORY

Mr. X was 28 years old at the time of presenting to Early Intervention Service (EIS) with acute onset of psychotic symptoms. Broadly he had auditory hallucinations-third and second person. He had a number of delusional beliefs-he believed he had power to protect the earth. He was convinced that the earth was on collision course with asteroids and planet X. He talked about the crop circles and the end of the world based on the Mayan calendar. He believed that he was having telepathic communication with the aliens who were giving him power and instruction on how to save planet earth. He was very anxious and distressed by his experiences.

Mr X had normal birth and developmental milestones. He suffered forehead-injury while playing on a skateboard around age 10 needing a brief period of hospitalisation. He also suffered with migraine from the age of 12, which had lately increased in frequency. He was taking painkillers for that. There was no known family history of aneurysm or subarachnoid haemorrhage (SAH).

His school period was uneventful until when he started to use cannabis at age 15 and shortly thereafter he started to drink alcohol alongside taking cannabis. At the time of his referral, it was reported that his behaviour

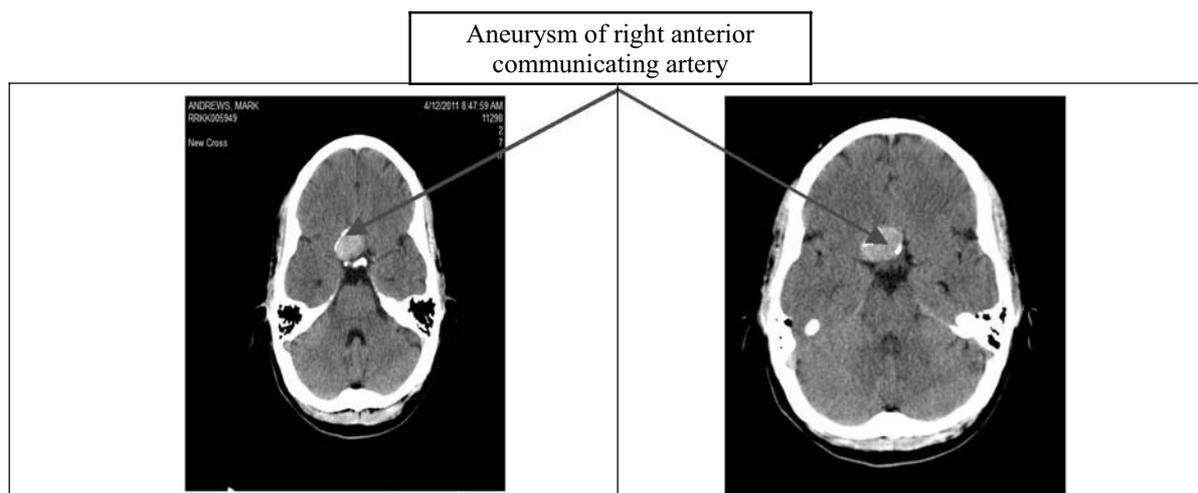


Figure 1. Aneurysm

had suddenly deteriorated. He had unprovoked rage where he became aggressive to his parents, smashed things in the house, and he became sexually disinhibited.

At the same time he drunk excessively and continued to use cannabis. Mr. X was admitted on the acute ward. On admission, physical examination including neurological examination was unremarkable. Mr. X remained unsettled and disturbed on ward for several weeks despite being on adequate dose of antipsychotic medication including benzodiazepine. Eventually a head CT scan was requested.

INVESTIGATIONS

Most of his blood tests were within normal range apart from slightly raised prolactin and mild lymphopaenia. He had normal GH, FSH.

Head CT scan report indicated that within the right frontal lobe in the region of suprasellar cistern was a solitary rounded hyperdense lesion measuring 2.5 cms in diameter with well-defined margin and show some calcification (Figure 1a, b). The lesion was causing minor effacement of 3rd ventricle but there was no evidence of raised intracranial pressure. No other pathology was identified. Aneurysm and meningioma were considered as differentials. Subsequent investigations confirmed that he had an aneurysm of right anterior communicating artery. Mr. X underwent successful endovascular coiling surgical intervention.

DISCUSSION

We have presented a case of a young man with unruptured right anterior communicating artery aneurysm who presented with FEP. His aneurysm was eventually successfully treated as well as his psychotic symptoms. The aneurysm was located on the most common intracranial area for men- the anterior communicating artery, part of ACA according to Koivisto categories

of aneurysm location (Ghods 2012). Incidental CT or MRI scan findings are quite common in normal population and the majority of them won't require and medical or surgical interventions (Katzman 1999). A study of 1000 asymptomatic volunteers with mean age of 30.6 years noted that 18% had abnormal findings. Only one person (0.1%) was suspected to have aneurysm. A meta-analysis study looking at brain MRI involving 19559 participants, noted that 2.7% had incidental findings (Morris 2009), the single most common findings was an arachnoids cysts (0.5%) followed by aneurysm (0.35%). Interestingly however, brain MRI scan study involving 2536 healthy young males, mean age 20.5 years by Weber & Knopf found no aneurysms (Weber 2006). Studies examining patients with FEP appear to come to the same conclusion. A review based on 24 studies looking at structural imaging in psychosis noted that there were more incidental findings, however; only 5% on MRI and 0.5% CT findings would influence clinical management. An MRI/CT imaging review for patient with FEP by Goulet et al. observed that in a total sample of 384 CT scans, 20.8% had minor or non-specific findings (Goulet 2009). A very small proportion (1.3%), the abnormal finding was considered to the underlying cause of psychosis and a further 1% needed further investigations. However, in that sample, no one was noted to have cerebral aneurysm. More recently another study came to similar conclusion. Khandanpour et al. examined 112 consecutive patients with FEP sent for brain MRI scan and 205 for CT examination. It was noted that 62.5% had incidental brain lesions on MRI study and only 2.7% their lesions were considered to be causal. The findings were 65.2% incidental on CT and only 1.5% were considered the underlying cause of psychosis (Khandanpour 2012). Based on some of these reviews, NICE 2008 came to the conclusion that "the use of structural neuroimaging technique should not be recommended as a routine part of the initial investigations for the management of FEP".

Was the aneurysm in Mr. X the cause of his psychosis? Based on the presentation, Mr. X did not have any neurological deficits on examination. The aneurysm was outside the brain matter and did not exert pressure on important areas of the brain. Though there was calcification around the border, there was no evidence of ischaemic changes to account for psychosis. His symptom profile did not suggest organic cause apart from the acute onset, and behaving out of character, which could have been modified by increased alcohol use and on going cannabis use. Still clinicians need to remain vigilant and to undertake physical including neurological examination for patients presenting with FEP given the observation that most patients who have significant finding on CT/MRI needing medical attention would have associated neurological findings (Khandanpour 2012, Albon 2008). It is estimated that 5-15% of psychosis have organic causes and the underlying causes vary widely in nature (Albon 2008). Apart from presenting with neurological deficits, organic psychosis tends to present with paranoid thoughts and thought disorder is rare (Albon 2008). Though it is said that the incidence of subarachnoid haemorrhage has slightly decreased between 1950-2005 (de Rooij 2007), the untreated aneurysm stands at risk of rupturing. It is estimated that the incidence of rupturing is around 9-12 in 100,000 (Wolfe 2006, de Rooij 2007). Risks related with rupture includes smoking, female gender, being over the age of 50, hypertension, heavy alcohol use, and polycystic kidney disease and family history of intracranial aneurysm or SAH (Vlak 2011, de Rooij 2007). The size and location of the aneurysm matters too. An International study involving 4060 patients who did not have a history of subarachnoid haemorrhage noted that the risk of rupture within five years period increased with the size and the location of the aneurysm. Aneurysms located on the posterior circulating and posterior communication arteries had the highest risk matched by size compared to other areas (Wiebers 2003). A meta-analysis by Rooij et al. noted that at the young age, the incidence of rupture was higher in men until the age of 55 (de Rooij 2007). Mr. X had a number of risk factors related with rupture-he smoked, male with young age, he used alcohol excessively when he was acutely ill and his aneurysm was 25mm. Aneurysms larger than 25mm carried the highest risk of rupture between 40-50% depending on their location (Wiebers 2003).

Cerebral aneurysms in the first three-decade of life are rare (Morris 2009, Weber 2006).

Psychosis in young age related with intact aneurysm is even rarer. Aneurysms in FEP are more likely to be a coincidental rather than the underlying cause (Goulet 2009, Khandanpour 2012).

Case reports on intact intracranial aneurysm being the underlying cause of FEP are rare to find. We found none during our search. However, Woo & Sevilla reported a case of 65 years Caucasian man with no past psychiatric history, who presented with depression,

mania and paranoia (Woo 2007). They attributed the symptoms to intact basilar artery aneurysm that was pressing against the pons. There have been few case reports of patients presenting with psychosis following rupture of cerebral aneurysm. Ruptured aneurysms presenting as psychosis in the absence of other neurological symptoms are very rare (Albon 2008). Hall and Young reported a case of ruptured frontal cerebral aneurysm that presented with psychosis (Hall 1992). Apart from papilloedema, neurological examination was normal. He had visual hallucination and paranoia and he was disoriented to time and place. A case of capgras syndrome following rupture of right middle cerebral artery aneurysm has also been reported (Bouckoms 1986).

In summary, coincidental findings on CT or MRI scan are common in the general population and in patients with FEP. Most findings will not change the diagnosis or management plan, however, in a small proportion of patients like Mr. X further investigation and intervention may be warranted. Intact intracranial aneurysm being the cause of the underlying psychosis in FEP is even rarer. However, clinicians need to remain vigilant and alert in conducting physical examination including neurological examination to FEP, given that those with underlying organic abnormalities tends to have positive neurological findings. NICE guidance on avoiding routine MRI or CT scan in FEP still hold true today. The mystery was finally solved.

Acknowledgements:

We would like to acknowledge the help we received from Jooly Joseph in connection with making sense of the images.

Conflict of interest: None to declare.

Contribution of individual authors:

Both Authors contributed equally to writing the case report.

References

1. Albon E, Tsourapas A, Frew E, Davenport C, Oyebode F, Bayliss S, Arvanitis T & Meads C: *Structural neuroimaging in psychosis: a systematic review and economic evaluation. Health Technol Assess* 2008; 12:1-184.
2. Bouckoms A, Martuza R, Henderson M: *Capgras syndrome with subarachnoid hemorrhage. Nerv Ment Dis* 1986; 174:484-488.
3. de Rooij KN, Linn FHH, van der Plas JA, Algra A & Rinkel GJE: *Incidence of subarachnoid haemorrhage: a systematic review with emphasis on region, age, gender and time trends. J Neurol Neurosurg Psychiatry* 2007; 78:1365-1372.
4. Ghods AJ, Lopes D & Chen M: *Gender differences in cerebral aneurysm location. Neurology* 2012; 3:1-6.
5. Goulet K, Deschamps B, Evoy F, Trudel JF: *Use of brain imaging (computed tomography and magnetic resonance*

- imaging) in first-episode psychosis: review and retrospective study. *Can J Psychiatry* 2009; 54:493-501.
6. Hall DP, Young SA: Frontal lobe cerebral aneurysm rupture presenting as psychosis. *J Neurol Neurosurg Psychiatry* 1992; 55:1207-1208.
 7. Jeon TY, Jeon P, Kim KH: Prevalence of unruptured intracranial aneurysm on MR angiography. *Korean J Radiol* 2011; 12:547-553.
 8. Katzman GL, Dagher AP, Patronas NJ: Incidental findings on brain magnetic resonance imaging from 1000 asymptomatic volunteers. *JAMA* 1999; 282:36-9.
 9. Khandanpour N, Hoggard N, Connolly DJ: The role of MRI and CT of brain in first episode of psychosis. *Clin Radiol* 2012 Sep 4. [Epub ahead of pri].
 10. Morris Z, Whiteley WN, Longstreth WT, Jr, et al.: Incidental findings on brain magnetic resonance imaging: systematic review and meta-analysis. *BMJ* 2009; 339:b3016.
 11. National Institute for Health and Clinical Excellence (2008) structural neuroimaging in first-episode psychosis (CG136). London: National Institute for Health and Clinical Excellence.
 12. Vlak MH, Algra A, Brandenburg R, Rinkel GJ: Prevalence of unruptured intracranial aneurysms, with emphasis on sex, age, comorbidity, country, and time period: a systematic review and meta-analysis. *Lancet Neurol* 2011; 10:626-36.
 13. Weber F, Knopf H: Incidental findings in magnetic resonance imaging of the brains of healthy young men. *J Neurol Sci* 2006; 240:81-84.
 14. Wiebers DO, Whisnant JP, Huston J3rd, Meissner I, Brown RD Jr, Piepgras DG et al.: Unruptured intracranial aneurysms: natural history, clinical outcome, and risks of surgical and endovascular treatment. *Lancet* 2003; 362:103-110.
 15. Wolfe SQ, Baskaya MK, Heros RC, Tummala RP: Cerebral Aneurysms: Learning from the Past and Looking toward the Future (chapter 16): *Clin Neurosurg* 2006; 53:157-178.
 16. Woo BKP, Sevilla CC: New-Onset Paranoia and Bipolar Disorder Associated With Intracranial Aneurysm. *J Neuropsychiatry Clin Neurosci* 2007; 19:489-490.

Correspondence:

Ranbir Singh

Bedford East CMHT

Florence Ball House, Kimbolton Road, Bedford, UK

E-mail: Ranbir.Singh@elft.nhs.uk