Cavum septum pellucidum and psychopathy*

Päivi Toivonen, Mervi Könönen, Eini Niskanen, Olli Vaurio, Eila Repo-Tiihonen, Allan Seppänen, Hannu J. Aronen, Ritva Vanninen, Jari Tiihonen and Mikko P. Laakso

Summary
The presence of cavum septum pellucidum (CSP) has been reported to be a neurodevelopmental marker of psychopathy. We scanned 26 violent offenders and 25 controls; 2 offenders and 2 controls had CSP (8% in both groups). Thus, the presence of CSP is not a common or a unique feature of antisocial personality disorder or psychopathy.

Declaration of interest
None.

Studying psychopathy has several medico-legal implications. In 1999 the British Home Office drafted a proposal whereby an individual could be incarcerated if deemed potentially dangerous without being sentenced for violent criminal activity.1 Later this was launched as the Dangerous and Severe Personality Disorder Programme.2 However, psychopathy has gained attention as a form of behaviour that is destructive not only to society but also to the individual. At an individual level, studying psychopathy may provide a proxy to observe several domains of cognition, such as decision-making: psychopaths tend to choose wrong actions and not learn from these.3,4 If changes in the functioning of the central nervous system could be scanned, this would provide clues to detecting psychopathy. Hence, if a surrogate marker for psychopathy was to be found, it might help in the selection of individuals for incarceration. However, if such a marker was used carelessly or if it was unspecified, gross violations of basic human rights would ensue.

Raine et al have studied the presence of cavum septum pellucidum (CSP) in people with antisocial personality disorder and psychopathy.5 In their study, people who had CSP had a higher degree of psychopathy and higher levels of antisocial personality disorder. What prompted Raine et al to study CSP was data from trials conducted with various experimental animals, ranging from rodents to monkeys, where anomalies or irritation of septum pellucidum has been found to be associated with increased aggression.6,7 So far, Raine et al’s study has not been replicated (Google Scholar, accessed on 5 May 2013). We therefore set out to replicate their study, using our own material, aiming to confirm or contest their results.

Method

Participants
Participants in this study were all men; there were 26 violent offenders and 25 age-matched healthy controls from a control pool (mainly hospital staff, friends, students, spouses, etc.). Data about the offenders were derived from university forensic psychiatric hospital records where they had been evaluated for pre-trial purposes. All were charged with violent offences (two murder, ten manslaughter, four attempted murder or manslaughter, one assisting manslaughter, six aggravated assaults and three armed robberies). Each had a history of recurrent violent acts, and all but two had previous convictions. None had a history or current diagnosis of psychosis. The diagnoses were made by consensus by using multiple sources of information. All of the offenders fulfilled criteria for both antisocial personality disorder (DSM-IV)8 and disocial personality (ICD-10).9 Psychopathy Checklist – Revised (PCL-R)10 ratings were used to assess psychopathy. Moreover, all met the DSM-IV and the ICD-10 criteria for substance abuse related to poly substance drugs (n = 20) or alcohol abuse (n = 6) with early-onset alcoholism corresponding to Cloninger type 2 young-onset alcoholism. As none were psychotic, all were judged to be competent to stand trial.

The study setting was approved by the local ethics committee.

Imaging

The participants were scanned with a 1.0 T Impact (Siemens; Erlangen, Germany) using a standard head coil and a tilted T1-weighted sequence (MPRAGE, repetition time (TR) = 10 ms, echo time (TE) = 4 ms, inversion time (TI) = 250 ms, flip angle 12°, field of view (FOV) = 250 mm, matrix 256 × 192, 1 acquisition), no interslice gap. The images thus acquired were resliced to 1.0 mm thick continuous coronal slices, no gap, perpendicular to the anterior–posterior commissural (AC–PC) line using SPM2 software on Windows.

Image analysis and the definition of CSP

Image analysis took place using Analyze 6.0 software on Windows. Identical criteria to those used by Raine et al were used. The presence of CSP was defined as CSP present in six or more 1.0 mm thick coronal slices.

Results

The two groups were matched for age (control group: mean age 35 years (s.d. = 8), offender group: mean age 34 years (s.d. = 10)). The mean PCL-R score in the offenders was 26.2 (s.d. = 3.8, range 20–34). Cavum septum pellucidum was present in two controls and two offenders (8% in both groups). In addition to CSP, one of the controls had cavum vergae.

Discussion

In this study we investigated whether violent offenders have an increased prevalence of CSP compared with a control group. We found this not to be the case. Our setting was similar to that in Raine et al’s study;7 the only difference being that Raine et al...
collected data from temporary employment agencies, whereas we collected ours from pre-trial forensic psychiatric examinations. Therefore Raine and colleagues’ material is from, as they state, ‘successful’ criminals who have avoided incarceration. Be that as it may, our criminals were probably studied more carefully, with the forensic psychiatric examination typically lasting months.

A large neuropathological study has suggested that 100% of preterm children have CSP. Postpartum, in full-term infants the prevalence falls quickly, ranging from absent to about 10% by the age of 16.² Our finding of 8% in both groups is very close to this. In conclusion, we suggest that the presence of CSP is not an exclusive, or even a typical, feature of violent individuals with antisocial personality disorder or psychopathy.

Päivi Toivonen, MD, Vanha Vaasa Hospital, Vaasa, Finland; Mervi Könönen, MSc, Eini Niskanen, MSc, Department of Clinical Radiology, Department of Neurophysiology, Kuopio University Hospital, Kuopio, Finland; Olli Vuorio, MD, Eila Repo-Tihonen, MD, PhD, Niuvanniemi Hospital, Kuopio, Finland; Allian Seppäläinen, MD, PhD, Vanha Vaasa Hospital, Vaasa, Finland; Hannu J. Aronen, MD, PhD, Department of Radiology, Tampere University Hospital, Tampere, Finland; Ritva Vainionen, MD, PhD, Department of Clinical Radiology, Kuopio University Hospital, Kuopio, Finland; Jari Tiililä, MD, PhD, Niuvanniemi Hospital, Kuopio, Finland; and Department of Clinical Neurosciences, Karolinska Institutet, Stockholm, Sweden; Mikko P. Laakso, MD, PhD, Vanha Vaasa Hospital, Vaasa, Finland, and Department of Clinical Radiology, Kuopio University Hospital, Kuopio, Finland

Correspondence: Mikko P. Laakso, MD, PhD, Vanha Vaasa Hospital, Rolling Stone Road 1 65380 Vaasa, Finland. Email: mikko.laakso@uef.fi

First received 16 Nov 2012, final revision 7 May 2013, accepted 13 May 2013

Funding

This study was supported by funding from annual EVO financing (special government subsidies) to Niuvanniemi and Vanha Vaasa Hospitals and by the Sigrid Juselius Foundation.

References


Cavum septum pellucidum and psychopathy
Päivi Toivonen, Mervi Kööhonen, Eini Niskanen, Olli Vaurio, Eila Repo-Tiihonen, Allan Seppänen, Hannu J. Aronen, Ritva Vanninen, Jari Tiihonen and Mikko P. Laakso
Access the most recent version at DOI: 10.1192/bjp.bp.112.123844

References
This article cites 7 articles, 3 of which you can access for free at:
http://bjp.rcpsych.org/content/203/2/152#BIBL

Reprints/permissions
To obtain reprints or permission to reproduce material from this paper, please write to permissions@rcpsych.ac.uk

You can respond to this article at
/letters/submit/bjprcpsych;203/2/152

Downloaded from
http://bjp.rcpsych.org/ on July 8, 2017
Published by The Royal College of Psychiatrists

To subscribe to The British Journal of Psychiatry go to:
http://bjp.rcpsych.org/site/subscriptions/