

Letter - Basic and Applied Anatomy

## Median occipital fossa: is it really a sign of crime or simply an anatomical variant?

Domenico Chirchiglia<sup>1,\*</sup>, Pasquale Chirchiglia<sup>1</sup>, Rosa Marotta<sup>2</sup>Departments of <sup>1</sup>Neurosurgery and <sup>2</sup>Health Sciences, University Of Catanzaro, Italy

### Abstract

Anatomical variants are alterations of the form, thickness, length, width, position of organs and anatomic structures that can cause problems of a functional nature. They can be vascular, bony, muscular and more. They represent anomalies that may cause disturbances or do not cause changes in functions. The criminologist Cesare Lombroso had correlated the anatomical variations to the criminal tendency. The most emblematic case was that related to the alleged brigand Villella, on which Lombroso, performing the autopsy, found in the skull the so-called median occipital fossa or a third dimple. He stated that the median occipital dimple was considered a sign of atavism, the expression of the criminal. In fact all the anatomical variants described by Lombroso are variations of normality. No one ever said that anatomical variants were a sign of crime. In conclusion, anatomical variants cannot be related to crime tendency, therefore the debated median occipital fossa is only and simply an anatomical variant.

### Key words

Anatomy, anatomical variants, median occipital fossa, Cesare Lombroso.

Dear Editor,

The occipital bone is the main bone of the occiput, lower part of the skull. It is trapezoidal in shape and overlies the occipital lobes of the cerebrum. The base of the skull in the occipital bone contains the foramen magnum, which allows the passage of the spinal cord. From front to back there is the basilar part, at the sides of the foramen magnum are the lateral parts, and the back is the squamous part. The inner surface of the occipital bone forms the base of the posterior cranial fossa. The median internal occipital crest travels behind it to the internal occipital protuberance, and serves as a point of attachment to the falx cerebri.

The inner surface of the occipital bone presents four fossae or depressions. At the midpoint where the depressions intersect is the internal occipital protuberance. Near the center of the outer surface of the squamous part of the occipital there is a prominence, the external occipital protuberance. The criminologist Cesare Lombroso claimed to have studied the skull of 452 criminals and to have found in 16 of them the substitution of the internal occipital prominence with a dimple, which he called the median occipital fossa.

\* Corresponding author. E-mail: [chirchiglia@unicz.it](mailto:chirchiglia@unicz.it)

“The median occipital dimple that replaces the lower half of the normal internal occipital ridge is between its two branches that spread towards the occipital foramen: it is almost always missing in the orangutan and the gorilla and it is constant in the other primates and inferior mammals (monotremes, marsupials, carnivores, rodents, etc.), in which the medium-developed cerebellum is reclining. In the inferior human races, particularly in the Aymara of America, in which it is found in 40%, in the madmen and in the degenerates it is present in greater proportions than in the normal civilized man and corresponds to a hypertrophy of the cerebellum worm (cerebellum median). It was from me for the first time noticed in the skull of a thief, certainly Villella, and I also established the atavistic meaning (Lombroso, 1876).

The Lombrosian theories on atavism and morpho-anthropology today have a purely historical value. Physiognomy and craniometry are currently revisited critically. Regarding the anomaly of the median occipital dimple, which according to Lombroso was present in the delinquents, it remains a historical finding. In fact, there is no trace in the literature of the anomaly found by Lombroso. The scientific works of some interest concerning anatomical variants of the occipital bone include misalignment between the internal occipital crest and internal occipital prominence (D’Costa et al., 2009; Kim and Ahmad, 2016).

Duplication of the falx of the cerebellum, occipital sinus and internal occipital crest were found (3), as well as a paracondylar process of the occipital bone (Narayanan et al., 2014). Another research showed an anomalous internal occipital crest causing hydrocephalus (Pozzati et al., 1979). Other studies have been conducted on the variations of the occipital condyle concerning length, width, shape, calibration (Mc Call et al., 2010). Anatomical variants are a non-rare condition. The above described researches confirm this. In none of these researches a combination of anomaly and tendency to crime have been described. Today, thanks to the increasingly innovative means of diagnostic investigation, the discovery of anomalies and anatomical variants is made easier. Anatomy has been used to formulate bizarre and even unthinkable hypotheses as in the case of Lombrosian thought. Time has shown that there is no correlation between anatomy criminal behaviour. The median occipital fossa was even questioned about its existence. Lombroso claimed to have found a fair number of criminals who had the median occipital fossa, considering this the sign of crime. No one then followed these theories, giving more interest to anatomical and physiological knowledge. There are many factors that come into play in the genesis of anatomical abnormalities, but certainly a normal human morphology can contain anatomical variants. The brigand Villella who was the object of Lombroso’s study apparently had the median occipital fossa and thus the latter represented for that author the mark of the criminal. It is more reasonable to assume that the medial occipital fossa is only an anatomical variant and has no connection to delinquency. Morpho-anthropology had a certain following outside Europe, in particular in the United States. The singular fact was that Lombroso’s theories were postulated in an era in which there was a great scientific activity, with discoveries in the anatomical and physiological fields. Anatomy is the study of the human body, which is in an advanced stage of knowledge.

There are however some variations in morphology compared to normal. Anatomical variants may be found in vascular districts, such as celiac tripod, superior mesenteric artery, vertebral artery, circle of Willis: the anomalies in origin and course of

the coronary arteries have a prevalence of 0.85%. Also the sciatic nerve has significant variations regarding its topography and division. A high level of sciatic nerve division is a relatively frequent phenomenon, and these variants can be found in its terminal branches, anywhere in the thigh or pelvis. In the latter case, its branches or even the entire nerve can emerge either below the piriformis muscle, or above it, or through it. The anatomic variant near the root of the nerve may be unilateral or bilateral and often leads to compression of the nerve with consequent piriformis syndrome.

In short, the presence of anatomical variants of body organs always offers new knowledge about human anatomy. Thus, the duplication of the cerebellar falx as the presence of the median occipital fossa must remain in the sphere which is due to them, that is, simple anatomical variants, and a criminal is not such for those anomalies.

### **Conflict of interest**

To the best of our knowledge, there is no possible conflict of interest for any author, nor have there been sources of financial support.

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