Arteries of the postcentral gyrus: a focused view
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Abstract
Introduction
The human postcentral gyrus (PG), situated between the central and postcentral sulci, forms the anterior part of the parietal lobe. The small nerve cells in this area receive and interpret sensations of pain, temperature, touch and pressure from the opposite side of the body. The purpose of this communication was to provide a focused view on the cortical arterial branches of the PG area and to discuss their clinical anatomy through relative cases from the literature.

Short communication
Central, anterior parietal and paracentral arteries are usually the suppliers of the PG area. Central and anterior parietal arteries are cortical branches of the middle cerebral artery. Paracentral artery is branch of the anterior cerebral artery (from the A4 segment or from the callosomarginal artery). At the lateral hemispheric surface, both the central and anterior parietal arteries supply approximately 7 branches to the PG area, often anastomosing. At the internal surface, paracentral artery supplies approximately three branches to the PG area.

Discussion
Pathological conditions potentially affecting the PG arteries are mainly cerebrovascular accidents and local tumours. Relative symptoms include contralateral sensory and motor disturbances, epileptic phenomena and non-specific symptoms. Furthermore, the surgical risk of arterial injury seems to be affected neither by the location (near to the central or postcentral sulcus) nor by the side (right-left) of a PG area lesion.

Conclusion
Future studies on PG vascular anatomy are needed to examine the diameter, emerging point location and subcortical distribution of the penetrating branches of this area.

Introduction
The human postcentral gyrus (PG) is a vertically oriented anterior convolution of the parietal lobe immediately posterior to the central sulcus1. It is specifically situated between the central and postcentral sulci (parallel to the central sulcus) and forms the anterior part of the parietal lobe. It faces Heschl's gyrus and they meet on the posterior ramus of the Sylvian fissure2. The lower part of the PG is positioned in front of the anterior bank of the supramarginal gyrus2 (Figure 1). The upper end of the PG together with the upper end of the precentral gyrus forms the paracentral lobule, overlapping onto the medial surface of the hemisphere2.

Figure 1: The PG location (sectioned model of the human brain, left hemisphere, lateral surface). 1: PG (lines), 2: central sulcus, 3: postcentral sulcus, 4: precentral gyrus, 5: precentral sulcus, 6: Sylvian fissure (lateral sulcus), 7: supramarginal gyrus, 8: parietal lobe, 9: temporal lobe, 10: frontal lobe.

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All authors contributed to conception and design, manuscript preparation, read and approved the final manuscript. All authors abide by the Association for Medical Ethics (AME) ethical rules of disclosure.
The purpose of this communication was to provide a focused view of the cortical arterial branches of the human PG area and to discuss their clinical anatomy through the very few relative cases available in the literature.

Short communication

The blood supply of the PG is provided by cortical branches of the anterior cerebral artery (ACA) (internal surface and a strip about 2.5 cm on the adjoining lateral surface) and middle cerebral artery (MCA)\(^4\). The MCA cortical branches at the PG area are the artery of the central sulcus (of Rolando) entering the central sulcus (central artery) and anterior parietal artery (artery of the postcentral sulcus)\(^4\). At the internal hemispheric surface the paracentral artery, branch of the ACA or of the callosomarginal artery (branch of the ACA), distributes at the cingulate sulcus (above the body of the corpus callosum) and central sulcus\(^4,5\).

The central and anterior parietal arteries supply the central and anterior parietal cortical areas (of the MCA territory) respectively. The inferior half of the PG (together with the superior part of the precentral gyrus) belongs to the central area, whereas the superior part of the PG (together with the upper part of the central sulcus, the anterior part of the inferior parietal lobule and the anteroinferior part of the superior parietal lobule) belongs to the anterior parietal area\(^4,5\).

The paracentral artery usually arises from the A4 segment of the ACA or from the callosomarginal artery, approximately midway the distance between the genu and splenium or the corpus callosum\(^5\). It usually courses anterior to the marginal limb of the cingulate sulcus or in the paracentral sulcus before turning vertically to the superior portion of the paracentral lobule, where it supplies a portion of the premotor, motor and somatic sensory areas. It may represent the terminal portion of the ACA\(^4,5\).

To the author’s gross anatomical experience, at the lateral hemispheric surface, both central and anterior parietal arteries supply approximately 7 branches (range: 4–13 and 3–11 respectively) to the PG area, often anastomosing. At the internal surface, paracentral artery supplies approximately three branches (range: 2–5) to the PG area. The penetrating cortical branches are occasionally difficultly identifiable, especially those of the paracentral artery.

Discussion

Vascular pathologies can rarely affect selectively the arterial branches supplying the PG and in such cases produce symptoms usually related to sensory disturbances of (parts of) the contralateral hemibody. Transient ischaemic attacks and lacunar strokes of the PG are characteristic examples of such events. Compression of the PG area due to space-occupying lesions, including haematomas and tumours, can also produce such symptoms.

Cortical sensory disturbances due to lesions at the somatosensory area of the PG often appear on the upper extremities and face, and rarely occur localised in the distal portion of the lower extremities\(^6\). Miyamura et al.\(^6\) reported a case of postcentral infarction in a 70-year-old woman, which manifested as sensory disorders localised at the distal portion of the right lower extremity. Sensory disorders were characterised by the disturbances of discriminative sensation.

Elemental senses were nearly normal. Magnetic resonance imaging (MRI) revealed cerebral infarction localised at the superior portion of the PG and medial surface of the parietal lobe and paracentral lobule of the left cerebral hemisphere. Carotid echography demonstrated stenotic lesions of the bilateral internal carotid arteries, suggesting that infarction of the cortical branch of the ACA (due to artery-to-artery embolism) was the cause of the condition\(^6\).

Matsumoto et al.\(^7\) reported three patients with ictal monoparesis of an arm. In the hemisphere contralateral to the monoparesis, ictal and interictal epileptiform discharges were observed in the centroparietal area and a well circumscribed lesion was commonly present in the primary arm somatosensory area. In the first (a 38-year-old woman), fluid-attenuated inversion recovery (FLAIR) image revealed a high-intensity abnormality along the right postcentral sulcus at the hand/arm portion where a fresh thrombus was noted in the right postcentral vein. A high-intensity abnormality was also observed in the PG to a lesser degree\(^7\).

The second (a 37-year-old man) experienced seizures starting with numbness and tingling sensation in the right hand for a while and mostly were followed by mild to moderate weakness of the right hand and arm without loss of consciousness. A meningioma was found in the left anterior parietal area, the majority of which was situated in the PG\(^7\). The third (a 30-year-old man) had frequent auras of palpitation and chest discomfort, which on two occasions evolved into clonic seizures of the left arm. MRI revealed a low-grade glioma localised in the right PG area. In the presence of a primary somatosensory area lesion, the epileptic activity at the sensorimotor area could lead to selective or predominant activation of the inhibitory motor system\(^7\).

Conclusion

Central, anterior parietal and paracentral arteries are usually the suppliers of the PG area. Pathological conditions potentially affecting these vessels are mainly cerebrovascular accidents and local space-occupying lesions. Relative symptoms include contralateral sensory and motor disturbances, epileptic activity and nonspecific symptoms. Furthermore, the surgical risk of arterial injury is probably affected neither by the location (near to the central or postcentral sulcus) nor by the side

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(right-left) of a PG area lesion. Future studies on PG vascular anatomy are needed to examine the diameter, emerging point location and subcortical distribution of the penetrating branches of this area.

**Abbreviations list**

ACA, anterior cerebral artery; FLAIR, fluid-attenuated inversion recovery; MCA, middle cerebral artery; MRI, magnetic resonance imaging; PG, postcentral gyrus.

**References**