Radicular arteries arise from the bifurcation of the spinal arteries, which arise at differing vertebral levels, from the vertebral, deep cervical, intercostal and lumbar arteries to supply the spinal cord. The smaller anterior radicular arteries enter the vertebral foramina and travel along the ventral nerve roots, which they supply. They commonly terminate along the ventral nerve roots or at the pial plexus of the spinal cord.

At the levels of the lower cervical, lower thoracic and upper lumbar regions, some anterior radicular arteries are larger and pass beyond their ventral nerve roots to reach the anterior median sulcus, where they anastomose with the anterior spinal artery via ascending and descending branches. Together with the anterior spinal artery, these large radicular branches may form an anastomotic vessel alongside the anterior median sulcus.