Vertebral venous plexus

see Batson venous plexus.

Before the 18th century, the vertebral venous plexus (VVP) received a scant mention, had no clinical relevance, and was largely ignored by anatomists, most likely because of its location and nondistensible nature. Gilbert Breschet in 1819 provided the first detailed anatomic description of the VVP, describing it as a large plexiform valveless network of vertebral veins consisting of 3 interconnecting divisions and spanning the entire spinal column with connections to the cranial dural sinuses distributed in a longitudinal pattern, running parallel to and communicating with the venae cavae, and having multiple interconnections. More than a century passed before any work of significance on the VVP was noted. In 1940, Oscar V. Batson (Batson venous plexus) reported the true functionality of the VVP by proving the continuity of the prostatic venous plexus with the VVP and proposed this route as the most plausible explanation for the distribution of prostate metastatic disease. With his seminal work, Batson reclassified the human venous system to consist of the caval, pulmonary, portal, and vertebral divisions. Further advances in imaging technology confirmed Batson's results. Today, the VVP is considered part of the cerebrospinal venous system, which is regarded as a unique, large-capacitance, valveless plexiform venous network in which flow is bidirectional that plays an important role in the regulation of intracranial pressure with changes in posture and in venous outflow from the brain, whereas in disease states, it provides a potential route for the spread of tumor, infection, or emboli [1).

Using corrosion casting, Zippel et al., demonstrate and describe a new vascular system–the vertebral venous plexus–in eight snake species representing three families. The plexus consists of a network of spinal veins coursing within and around the vertebral column and was previously documented only in mammals. The spinal veins of snakes originate anteriorly from the posterior cerebral veins and form a lozenge-shaped plexus that extends to the tip of the tail. Numerous anastomoses connect the plexus with the caval and portal veins along the length of the vertebral column. We also reveal a posture-induced differential flow between the plexus and the jugular veins in two snake species with arboreal proclivities. When these snakes are horizontal, the jugulars are observed fluoroscopically to be the primary route for cephalic drainage and the plexus is inactive. However, head-up tilting induces partial jugular collapse and shunting of cephalic efflux into the plexus. This postural discrepancy is caused by structural differences in the two venous systems. The compliant jugular veins are incapable of sustaining the negative intraluminal pressures induced by upright posture. The plexus, however, with the structural support of the surrounding bone, remains patent and provides a low-pressure route for venous return. Interactions with the cerebrospinal fluid both allow and enhance the role of the plexus, driving perfusion and compensating for a posture-induced drop in arterial pressure. The vertebral venous plexus is thus an important and overlooked element in the maintenance of cerebral blood supply in climbing snakes and other upright animals [2).

References

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[2)]

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