The second thoracic ventral nerve roots contain efferent somatic nerve fibers corresponding to the second thoracic segment, as well as preganglionic sympathetic fibers from the lateral horn of the second thoracic segment. They emerge as two or three rows of rootlets from the antero-lateral sulci of the spinal cord and are slightly smaller than their corresponding dorsal roots. Between adjacent rootlets are interradicular spaces, which contain small blood vessels.

The roots pass obliquely infero-laterally through the intervertebral foramina between the pedicles of T2 and T3 and over the superior surfaces of the transverse processes of T3 to join with the second thoracic dorsal roots to form the second thoracic spinal nerves. The roots are covered by a sleeve of pia mater, which is continuous with that of the spinal cord, and loosely invested by a prolongation of dura and arachnoid mater (the dural sleeve) almost as far as the spinal nerves.