H1 Expressions of Handedness in the Vertebral Column

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The observer of this poster will learn the usefulness of a new technique to determine handedness from the seventh cervical, thoracic, and lumbar vertebrae.

The goal of this study is to evaluate a new approach to determining handedness by looking at laterality of the spinous processes of the vertebral column. The spinous process of the vertebra is a potential indicator of handedness as it is the attachment site for a number of muscles and ligaments associated with support and movement of the upper limb, and repetitive and preferential use of one arm over the other may be reflected in a deviation of the process to either the left or right of the midline. The major muscles of the vertebral column associated with positioning of the pectoral girdle and movement of the arm include the trapezius and latissimus dorsi. The trapezius muscle attaches to the spinous processes of C7T12 and the latissimus dorsi T7-L5. This research specifically focuses on these vertebrae.

Previous anthropological research on handedness has traditionally concentrated on observable bone indicators of musculoskeletal stress such as humeral asymmetry (the robusticity of muscle attachment sites and long bone length), differences in the length of paired arm elements, clavicular length and robusticity, scapular joint surface changes, and metacarpal size differences. Additional relationships explored include bone density and trabecular patterning, jugular foramen size and humeral expressions of the intertubercular sulcus, and nutrient foramen. These relationships have been investigated by comparing the degree and/or size of traits as expressed in the paired right and left elements.

General observations on the deviation of the spinous processes from the midline have been made in both the chiropractic and clinical literature (Oliver and Middleditch, 1991). Chiropractic research by Redmond (1996) on unassociated and demographically unknown lumbar vertebra found the majority of spinous processes in his sample generally deviated to the right of the vertebral midline. He suggests this may be a consequence of unequal stress being applied to the processes from muscular strength differences associated with arm dominance. Additionally, the role handedness plays on the overall shape of the vertebral column has been clinically observed by Hollinshead (1982) who notes that some lefthanded individuals display lateral curvature with the convexity of the curve to the left.

For the purpose of this research, vertebrae of both males and females from the William M. Bass Donated and Forensic Skeletal Collections were examined. These skeletons are of individuals with known handedness information. In human populations, the majority of individuals are right-handed, with preferential left-handedness ranging between 10-13% (see Steele 2000 for a review). The distribution of rightand left-handed individuals in this dataset is reflective of the distribution in the general population. Photographs were taken of the superior view of the vertebrae and a deviation of the spinous process from the vertebral midline was measured in degrees.

Preliminary results indicate a majority of individuals show an observable deviation from the midline of the spinous process to the right, an anticipated finding since the majority of individuals are right-handed. Further research may indicate the (f) utility of this technique in the determination of handedness for forensic applications.

Handedness, Spinous Process, Vertebral Column

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