World Academy of Science, Engineering and Technology
International Journal of Animal and Veterinary Sciences
Vol:11, No:09, 2017

Variations in the Angulation of the First Sacral Spinous Process Angle Associated with Sacrocaudal Fusion in Greyhounds

Authors : Sa'ad M. Ismail, Hung-Hsun Yen, Christina M. Murray, Helen M. S. Davies

Abstract : In the dog, the median sacral crest is formed by the fusion of three sacral spinous processes. In greyhounds with standard sacrums, this fusion in the median sacral crest consists of the fusion of three sacral spinous processes while it consists of four in greyhounds with sacrocaudal fusion. In the present study, variations in the angulation of the first sacral spinous process in association with different types of sacrocaudal fusion in the greyhound were investigated. Sacrums were collected from 207 greyhounds (102 sacrums; type A (unfused) and 105 with different types of sacrocaudal fusion; types: B, C and D). Sacrums were cleaned by boiling and dried and then were placed on their ventral surface on a flat surface and photographed from the left side using a digital camera at a fixed distance. The first sacral spinous process angle (1st SPA) was defined as the angle formed between the cranial border of the cranial ridge of the first sacral spinous process and the line extending across the most dorsal surface points of the spinous processes of the S1, S2, and S3. Image-Pro Express Version 5.0 imaging software was used to draw and measure the angles. Two photographs were taken for each sacrum and two repeat measurements were also taken of each angle. The mean value of the 1st SPA in greyhounds with sacrocaudal fusion was less (98.99°, SD ± 11, n = 105) than those in greyhounds with standard sacrums (99.77°, SD ± 9.18, n = 102) but was not significantly different ($P < 0.05$). Among greyhounds with different types of sacrocaudal fusion the mean value of the 1st SPA was as follows: type B; 97.73°, SD ± 10.94, n = 39, type C: 101.42°, SD ± 10.51, n = 52, and type D: 94.22°, SD ± 11.30, n = 12. For all types of fusion these angles were significantly different from each other ($P < 0.05$). Comparing the mean value of the1st SPA in standard sacrums (Type A) with that for each type of fusion separately showed that the only significantly different angulation ($P < 0.05$) was between standard sacrums and sacrums with sacrocaudal fusion sacrum type D (only body fusion between the S1 and Ca1). Different types of sacrocaudal fusion were associated with variations in the angle of the first sacral spinous process. These variations may affect the alignment and biomechanics of the sacral area and the pattern of movement and/or the force produced by both hind limbs to the cranial parts of the body and may alter the loading of other parts of the body. We concluded that any variations in the sacrum anatomical features might change the function of the sacrum or surrounding anatomical structures during movement.

Keywords : angulation of first sacral spinous process, biomechanics, greyhound, locomotion, sacrocaudal fusion
Conference Title : ICAA 2017 : International Conference on Animal Anatomy
Conference Location : Zurich, Switzerland
Conference Dates : September 15-16, 2017