Investigation of the reliability of saddle fitters to determine the position of the last thoracic vertebra of horses using palpation techniques: A pilot study.

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INTRODUCTION: Poorly fitting saddles compromise performance and contribute to equine back pain. The correct length of an English saddle leaves the scapulae free, with the saddle tree not extending beyond the eighteenth thoracic vertebra (T18). The aim of this two-part pilot study was to determine whether saddle fitters (SFs) could reliably locate the spinous process (SP) of T18 by comparing their estimation of the position of T18 with that determined by a veterinary surgeon (VS) using radiography.

METHOD PART 1: Lateral-lateral radiographs of the SPs of the thoracolumbar junction were acquired in 7 horses (Group A) height 163 ± 8 cm; bodyweight 543kg ± 40kg; body condition score (BCS) 4.6 ± 0.6 (out of 9, Henneke et al. 1983). The VS placed a marker on the summit of T18, determined from the position of the last rib. An additional random marker was placed on the lumbar region and distance T18VS (cm) measured (see Fig 1).

The T18 marker was removed and 3 SFs determined T18 using their normal palpation technique and to placed a marker on it.

SF1 and SF2 found T18 by palpating the lumbosacral joint (LSJ) and counting cranially six SPs, whilst SF3 followed the rib curvature towards the dorsal midline. Distance T18SF (cm) was measured for each SF (see Fig 2). T18VS-T18SF was calculated for each SF with a -ve value = SF marker placement cranial to that of the VS and +ve value = SF marker placement caudal to that of the VS.

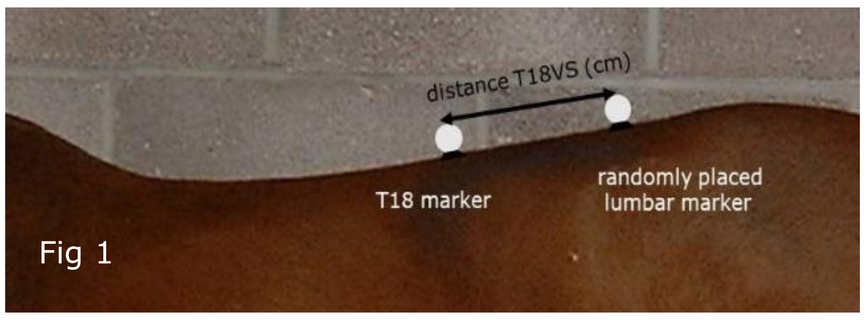

Fig 1

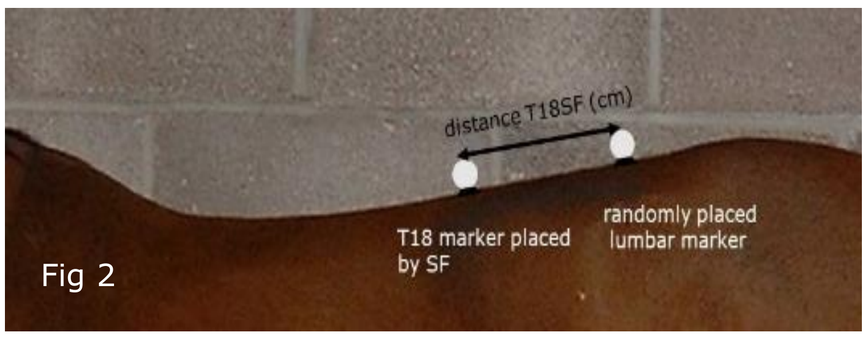

Fig 2

RESULTS PART 1: SF1 and SF2 placed their markers cranial to T18VS in 6/7 horses (see Table 1). The differences between T18SF1 and T18VS, and T18SF2 and T18VS were significant (t-test, P=0.032, respectively). SF3 placed their marker caudal to T18VS in 4/7 horses. The mean difference between T18SF3 and T18VS was 0.1 cm, but with wide CI (95% CI: -9.5 cm; 9.6 cm; P=0.976) (see Fig 3).

Horse	T18VS-T18SF1	T18VS-T18SF2	T18VS-T18SF3
A1	-9.0	-7.5	-5.1
A2	-2.0	-1.5	2.2
A3	-2.5	-8.0	2.4
A4	-1.5	0.0	1.7
A5	-5.0	-5.5	-0.9
A6	0.5	1.0	7.2
A7	-10.5	-8.5	-7.1
mean	-4.3	-4.3	0.1
s.d.	4.1	4.0	4.9

Table 1 (right): The difference between the VS and the SFs placement of the T18 marker given by T18VS-T18SF (-ve = cranial to T18 and +ve = caudal to T18 (cm).

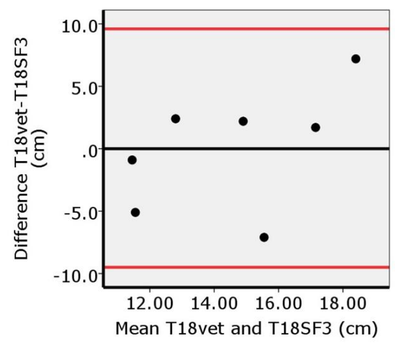

Fig 3: Bland-Altman plot showing the difference between T18VS and T18SF3 (cm) plotted against the mean of T18VS and T18SF3 with reference lines showing the confidence intervals.

METHOD PART 2: Based on the results of Part 1, SF1 and SF2 were asked to locate the SP of T18 using a 'count cranially five SPs' method in a group of 7 horses (Group B) height 159 ± 10 cm; bodyweight 559 ± 61 kg and BCS 5.1 ± 0.5. Three overlapping lateral-lateral radiographic images of the SPs of the thoracic and cranial lumbar region were acquired. On the assumption that T2 was the most cranial SP identified, by counting caudally the SP of T18 was identified by the VS (see Fig 4 a-c). T18VS-T18SF was calculated for each SF as in Part 1.

The SFs were then asked to repeat marker placement in the same group of horses to obtain intrarater reliability.

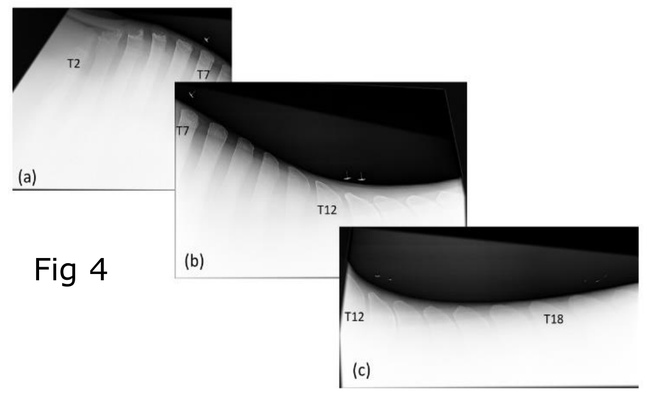

Fig 4

RESULTS PART 2: SF1 and SF2 placed their markers cranial to T18VS in 4/7 horses (see Table 2). The mean difference between T18SF1 and T18VS was -1.5 cm (95% CI: -8.3 cm, 5.1 cm; P=0.265). The mean difference between T18SF2 and T18VS was -0.3 cm (95% CI: -8.8 cm, 8.5cm; P=0.847).

Interrater reliability. The mean difference in T18SF between SF1 and SF2 using the 'count cranially five' method was 1.4 ± 2.6 cm. The level of interrater reliability was found to be 'good' for ICC single measures, absolute agreement: 0.80; 95% CI 0.28-0.96; P=0.007.

Intrarater reliability. The mean difference in repeat measures for SF1 and SF2 was 1.2 ± 1.1 cm and 0.7 cm ± 2.3 cm, respectively. The mean intrarater reliability for SF1 was 'excellent' for single measures, absolute agreement: 0.91; 95% CI 0.20-0.99; P=0.0001. The mean intrarater reliability for SF2 was 'good' for SF2 for single measures, absolute agreement: 0.85; 95% CI 0.39-0.97; P=0.005.

Horse	T18VS-T18SF1	T18VS-T18SF2
B1	0.6	6.2
B2	2.0	3.4
B3	-8.0	-7.7
B4	-1.5	0.3
B5	-3.0	-3.5
B6	-2.5	-0.3
B7	1.3	-0.8
mean	-1.5	-0.3
s.d.	3.4	3.4

Table 2. T18VS-T18SF in SF1 and SF2 using a 'count cranially five' SPs method. -ve = SF marker placement cranial to T18 and +ve = SF marker placement caudal to T18 (cm).

CONCLUSIONS: Counting cranially five SPs from the LSJ joint should enable saddle fitters to locate a point within 3.5 cm of T18 in most horses. Variations in vertebral formula and thoracolumbar morphology affect the ability of SFs to determine the position of the SP of T18 reliably by palpation. The 'count cranially five' method, when coupled with observation of the rib position should ensure a saddle tree does not extend to the lumbar region. Further work is needed to investigate the consequences of fitting a saddle beyond T18 and the effects of weight bearing beyond T18 on the horse's range of movement and performance.

REFERENCES: Henneke, D.R., Potter, G.D., Kreider, J.L. and Yeates, B.F. Relationship between condition score, physical measurements and body fat percentages in mares. Equine Vet J 1983; 15:371-2
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