

ORIGINAL RESEARCH

International survey of equine orthopaedic specialists reveals diverse treatment strategies for horses with overriding spinous processes

Dorothea Treß¹ | Christoph Lischer¹ | Roswitha Merle² | Anna Ehrle¹

¹Equine Clinic, School of Veterinary Medicine, Freie Universität Berlin, Berlin, Germany

²Institute for Veterinary Epidemiology and Biostatistics, School of Veterinary Medicine, Freie Universität Berlin, Berlin, Germany

Correspondence

Dorothea Treß, Equine Clinic, School of Veterinary Medicine, Freie Universität Berlin, Berlin, Germany.
Email: dtress@gmx.de

Abstract

Background: Overriding spinous processes, also known as ‘kissing spines’, are one of the most common causes of back pain in horses. The aim of this study was to investigate which options for diagnosis and treatment are preferred by equine orthopaedic specialists and assess which techniques are used for local injection.

Methods: An online survey was distributed among members of the European/American College of Veterinary Surgeons, the European/American College of Veterinary Sports Medicine and Rehabilitation, the International Society of Equine Locomotor Pathology and nationally recognised advanced equine orthopaedic practitioners.

Results: The survey was completed by 353 respondents. The injection techniques most commonly used involve placing two needles abaxial to the interspinous space (42%) under ultrasonographic guidance (32%) or one needle in the midline (35%) between two spinous processes. The most popular combination for overriding dorsal spinous process therapy was local injection (26.7%) combined with controlled exercise (25.5%). Manual therapy was considered by 42% of European and 25% of American specialists ($p = 0.01$). Surgical intervention as a first-line treatment was recommended mainly by specialists working in the United States, the UK or Ireland ($p = 0.001$). Overall, most equine orthopaedic veterinarians (71%; $n = 201$) preferred conservative management and recommended surgery only for horses that did not respond to conservative therapy.

Limitations: Respondents’ personal bias may have skewed the findings.

Conclusions: Despite a growing body of evidence, the therapeutic approach to ‘kissing spines’ in horses is influenced by professional specialisation and regional preferences. Variations in injection techniques and differing criteria for surgical intervention warrant further investigation.

KEYWORDS

equine, kissing spines, overriding spinous processes, vertebral column

INTRODUCTION

Impinging and overriding dorsal spinous processes (ORDSPs), also known as ‘kissing spines’, are one of the most common causes of thoracolumbar pain and poor performance in the equine athlete.^{1–3} ORDSPs are defined as the narrowing of the space between two thoracolumbar spinous processes to less than 4 mm and are mainly detected between T14 and L1.^{4–7}

Although the condition is readily identified on latero-lateral radiographs of the thoracolumbar vertebral column, the recognition of clinically significant ORDSPs remains challenging.^{7–10} ORDSPs are described in asymptomatic ridden horses as well as in horses with thoracolumbar pain.^{5,11–15} Clinical signs are often non-specific and range from loss of performance and pain on palpation to subtle gait alterations or behavioural changes.^{1,16,17} Radiographic

This is an open access article under the terms of the [Creative Commons Attribution-NonCommercial-NoDerivs](https://creativecommons.org/licenses/by-nc-nd/4.0/) License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2024 The Authors. *Veterinary Record* published by John Wiley & Sons Ltd on behalf of British Veterinary Association.

and scintigraphic evidence for ORDSPs is not necessarily correlated with clinical signs of thoracolumbar pain. The local infiltration of anaesthetic agents is recommended by some authors to confirm the significance of the diagnosis.^{7,8,18,19} However, accurate diagnosis may still be hampered by the close proximity of the articular process joints and the adjacent soft tissues, which can equally cause thoracolumbar pain.

Conservative treatment options for horses with ORDSPs include controlled exercise, manual therapy and anti-inflammatory medication, among others.^{3,20–22} Surgical desmotomy of the interspinous ligament and different techniques for the partial or total ostectomy of the affected ORDSPs are additionally described.^{4,6,23–27} A European and an American survey both showed that the local injection of corticosteroids is a treatment option favoured by many equine practitioners in recent years.^{17,28}

Local injections are frequently performed for diagnostic analgesia and medication of ORDSPs in the equine thoracolumbar vertebral column. Anecdotally, a variety of techniques that may or may not involve radiographic or ultrasonographic guidance are utilised.^{3,4,17,18} The aim of this study was to investigate which methods for diagnosis and treatment of ORDSPs are preferred by equine orthopaedic veterinarians and to assess which techniques are most commonly used for the local injection of the thoracolumbar vertebral column in horses with ORDSPs.

The authors hypothesised that equine orthopaedic veterinarians would choose significantly different methods for the diagnosis and treatment of ORDSPs depending on their training background, years of experience, caseload and geographic location. It was further hypothesised that a wide range of injection techniques, needle sizes and volumes would be used for the local injection of ORDSPs.

MATERIALS AND METHODS

Questionnaire design

A cross-sectional online survey (Supporting Information 1), including a total of 26 questions, was prepared with the open-source tool LimeSurvey (version 3.15.9 + 190214). There were 19 multiple-choice and seven open questions, written in the English language. Additionally, a free answer section, such as 'other options', was available for the majority of questions.

The beginning of the questionnaire contained a brief introduction, the contact details of the primary investigator and a statement of confidentiality as participation was anonymised. The first part of the survey contained questions related to demographic information, including qualification and specialisation, geographic location of practice, caseload and years of experience. The second part contained questions about preferred methods for back pain investigation.

Part three specifically asked for details of the injection techniques used, including needle size and position, volume and substance injected, and imaging modality used to guide the injection of ORDSPs in the equine thoracolumbar vertebral column. Further complications that might have been encountered following local injection of the equine thoracolumbar vertebral column were documented. The final section of the survey inquired about references for the management of ORDSPs in horses, including conservative and surgical treatment options. The questions were designed to permit completion of the survey within 10–15 minutes. The survey was internally tested with a group of 12 participants and approved by the local Committee on Research Ethics (StN 004/19) prior to distribution among equine orthopaedic veterinarians.

Survey distribution

An invitation to participate and a link to the web-based survey were sent by email to all registered large animal specialists with one or more of the following affiliations: member of the European College of Veterinary Surgeons (ECVS), American College of Veterinary Surgeons (ACVS), European College of Veterinary Sports Medicine and Rehabilitation (ECVSMR), American College of Veterinary Sports Medicine and Rehabilitation (ACVSMR), International Society of Equine Locomotor Pathology (ISELP) and nationally recognised advanced equine orthopaedic practitioners. The survey was additionally distributed among specialists during the ECVS and ECVSMR annual scientific meetings. Respondents were uniquely identified to eliminate duplicates but were not directly linked to the individual responses to ensure that all the answers were confidential. The survey was accessible online for 4 months. A follow-up email with a reminder was distributed 4 weeks before the end of the survey period.

Data analysis

The data were exported from LimeSurvey and recorded in Excel (version 2010, Microsoft). The data analysis was performed using SPSS (IBM SPSS Statistics 26). Incomplete responses were excluded and responses for individual answers were categorised. Data concerning the different injection techniques, including the choice of the needle size selected by veterinary specialists with varying backgrounds, were analysed using Pearson's chi-square test. Different volumes for injection were assessed using the Kruskal–Wallis test. The influence of geographic location and specialisation on respondents' preferences for injection or treatment selection was analysed with the independent *t*-test as well as the Kruskal–Wallis test and the Mann–Whitney *U*-test for non-parametric data. *p*-Values of less than 0.05 were considered significant.

FIGURE 1 Bar chart illustrating participants' qualifications. ACVS, American College of Veterinary Surgery; ACVSMR, American College of Sports Medicine and Rehabilitation; CertISELP, Certificate of International Society of Equine Locomotor Pathology; ECVS, European College of Veterinary Surgery; ECVSMR, European College of Veterinary Sports Medicine and Rehabilitation; Other, nationally recognised advanced equine orthopaedic practitioners

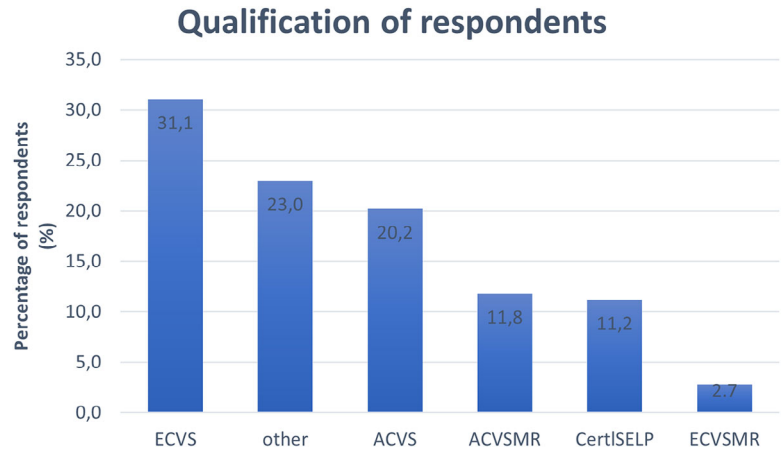


TABLE 1 Professional experience and caseload of participating advanced equine orthopaedic practitioners and specialists

Professional experience	<5 years	6–10 years	11–15 years	>15 years
Number, <i>n</i>	43	51	70	158
Percent	13.4	15.8	21.7	49.1
Orthopaedic caseload per month	<25%	25%–50%	50%–75%	75%–100%
Number, <i>n</i>	42	66	98	116
Percent	13	20.5	30.4	36
Caseload of horses with back pain per month	<2 horses	2–5 horses	6–10 horses	>10 horses
Number, <i>n</i>	32	108	89	79
Percent	10.4	35.1	28.9	25.6

RESULTS

Demographic information

The survey was sent to 1505 equine orthopaedic veterinarians, partly answered by 353 respondents and completed by 285 respondents (response rate 26%). The majority of respondents were practising in Europe (71%; *n* = 227), followed by North America (23%; *n* = 73), Australia (3%; *n* = 11), South America (*n* = 4), Africa (*n* = 4) and Asia (*n* = 3). Within Europe, most participants were based in the UK (17%; *n* = 59), followed by Germany (11%; *n* = 40) and France (6%; *n* = 21) (Supporting Information 2).

Members of the ECVS (31%; *n* = 100) and ACVS (20%; *n* = 65) comprised approximately 50% of the survey participants. ECVSMR (3%; *n* = 9), ACVSMR (12%; *n* = 38) and ISELP (11%; *n* = 36) members comprised 26% of respondents. The remaining participants (23%; *n* = 74) were orthopaedic surgeons holding a national specialist qualification (Figure 1).

A high number of respondents (49%; *n* = 158) indicated that they had been working in equine practice for more than 15 years, and orthopaedic and poor performance cases made up 50%–100% of the caseload of 66% (*n* = 214) of participants. Fifty-five percent of participants (*n* = 168) diagnosed six or more horses with back pain per month (Table 1).

Back pain investigation

Diagnostics

Palpation was generally used for the investigation of equine back pain (92%; *n* = 296) (Figure 2). Radiographic examination was generally added 'frequently' (31%; *n* = 95 of respondents selected that they use radiography in six of 10 cases) or 'very frequently' (26%; *n* = 79 use radiography in eight of 10 cases), and 23% (*n* = 51) of the European practising equine orthopaedic veterinarians used radiography in any case. Additionally, there was a positive correlation between the number of back injections performed and the number of radiographs taken ($p = 0.001$). Equine orthopaedic veterinarians who performed more than 10 injections per month (23.4%; *n* = 11) used radiographic examination in any case. Ultrasonographic examination was performed in approximately two to four of 10 cases by 49% (*n* = 150) of equine orthopaedic veterinarians.

Similarly, gamma scintigraphy was selected in two to four of 10 cases by 45% (*n* = 138) of veterinarians but appeared to be most popular in Australia and Asia (4–6 of 10 cases, $p = 0.008$). Thermography was rarely used (4.2%; *n* = 13).

The majority (95%; *n* = 290) of equine orthopaedic veterinarians confirmed that they would perform a full lameness workup if a horse presented with back pain and concurrent hindlimb lameness.

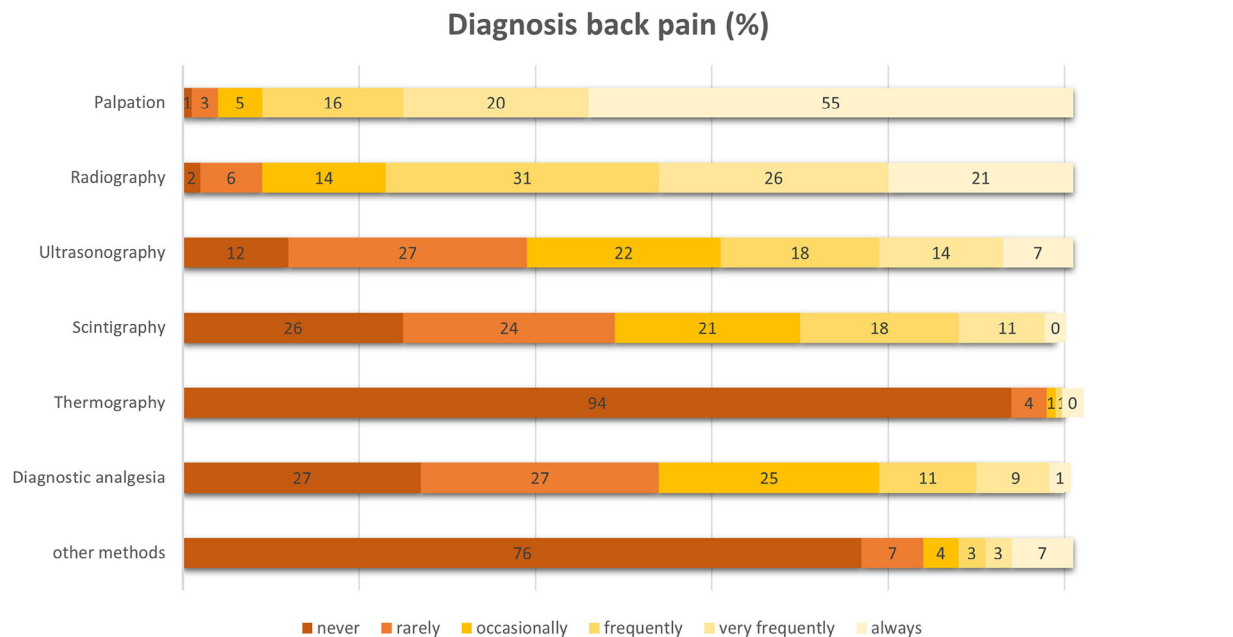


FIGURE 2 Graphical illustration of equine orthopaedic veterinarians' preferred methods for investigation of back pain

Diagnostic analgesia

Diagnostic analgesia in the area of the equine thoracolumbar vertebral column was used by 73% ($n = 223$) of survey participants. ECVS and ECVMSR specialists (16%; $n = 16$) used diagnostic analgesia particularly frequently (6–8 of 10 cases) when compared to ISELP members, where 39% ($n = 41$) of them stated that they would never opt for diagnostic analgesia ($p = 0.009$).

The horse was sedated for local analgesia if it was not compliant by 61% ($n = 129$) of equine orthopaedic veterinarians. Veterinarians with a high equine orthopaedic caseload were less inclined to sedate a horse for local analgesia ($p = 0.01$). Forty-nine percent of the respondents who saw more than 10 cases per month would never sedate a horse for local analgesia. Xylazine was the most commonly used sedative (65%; $n = 89$), followed by the combination of detomidine and butorphanol (13%; $n = 18$).

Back injection technique

The section with a focus on different techniques for the injection of ORDSPs in the equine thoracolumbar vertebral column was completed by 271 equine orthopaedic veterinarians. Common techniques used for local injection include placing the needle in the midline between two adjacent dorsal spinous processes (technique 1), placing two needles abaxial to the affected interspinous space (technique 2) or advancing one needle across the interspinous space in an oblique direction (technique 3) (Figure 3).

Overall, technique 2 was most commonly used (43%; $n = 116$), followed by technique 1 (35%; $n = 95$) and technique 3 (13%; $n = 35$) ($p = 0.02$). The remaining 9% ($n = 25$) of respondents used the free writing

field 'other option' to indicate that they would select a variation or combination of the described techniques. American-trained specialists (ACVS/ACVSMR) primarily used technique 1 (44%; $n = 37$), whereas European-trained specialists (ECVS/ECVSMR) (46%; $n = 45$) and ISELP members (48%; $n = 43$) used technique 2 more frequently ($p = 0.03$). Equine veterinary surgeons who saw more than 10 horses for back pain investigations each month preferentially used technique 2 (49%; $n = 35$) for local ORDSP injection.

'Other options' for injection or a combination of techniques 1 and 2, depending on the degree of narrowing of the interspinous space, were selected by 9% ($n = 25$) of veterinarians. In the free answer field associated with the 'other options' section, alternative approaches, including the oblique injection technique using two needles, one from either side of the interspinous space, were described. Additionally, the paramedian injection directed towards a specific osseous lesion was proposed.

In order to position the needle as correctly as possible, imaging may be used. Radiographic control of needle placement was the preferred method for equine orthopaedic surgeons (ECVS/ACVS) (17%; $n = 25$), whereas sports medicine-boarded veterinarians (ECVMSR/ACVSMR) used ultrasonographic guidance more often (38%; $n = 48$). Overall, 30% ($n = 82$) of specialists did not use any imaging guidance at all for local injection. The more injections are performed by an equine orthopaedic veterinarian per month, the less likely it is that imaging guidance is used. However, veterinarians who see less than two horses with back pain per month are more likely to use a combination of radiographic (27%; $n = 7$) and ultrasonographic guidance (39%; $n = 10$) ($p = 0.05$).

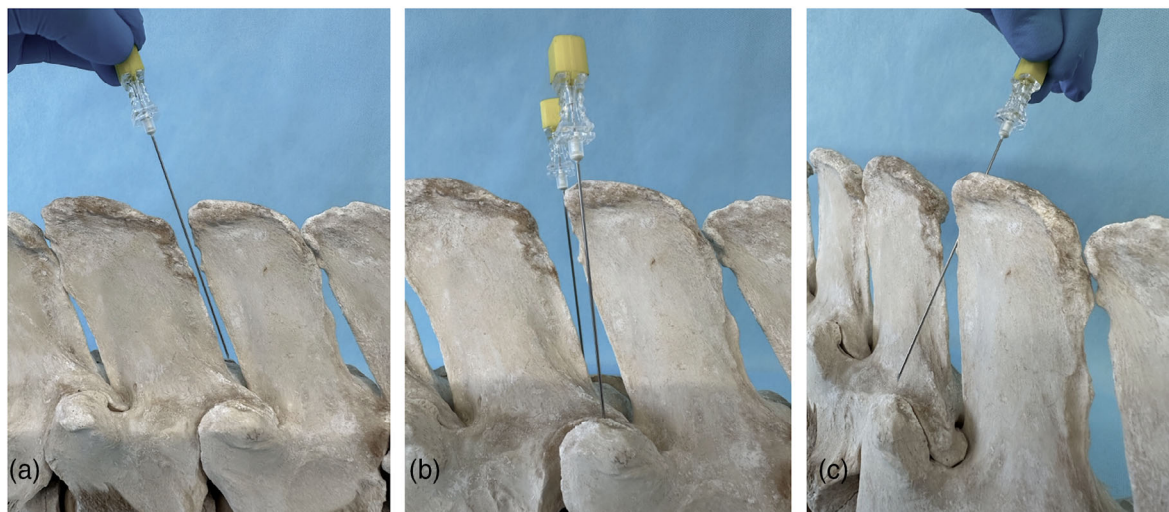


FIGURE 3 Three most commonly used techniques for local injection of overriding dorsal spinous process. (a) Placing one needle in the midline between two adjacent spinous processes. (b) Placing two needles abaxially, parallel to the affected interspinous space. (c) Advancing one needle across the interspinous space in an oblique direction

Type of needle used for injection

The 20 G (3.5 inch) yellow spinal needles were used for back injection by 120 respondents (44%; $n = 120$), whereas 60 (22%) used green needles (21 G; 2 inch).

The green needle (21 G; 2 inch) was used by European veterinarians (28%; $n = 54$) significantly more often when compared to respondents from the United States (7%; $n = 4$) ($p = 0.001$). The 18 G (3.5 inch) pink spinal needle was rarely used in Europe (6%; $n = 11$) but was favoured by American-boarded veterinarians (26%; $n = 16$). Overall, the yellow spinal needle (20 G; 3.5 inch) was used most frequently.

Medication—volume and dosage

Corticosteroids

Triamcinolone acetonide (38%; $n = 41$), dexamethasone (2 mg/mL) (34%; $n = 37$) and methylprednisolone acetate (40 mg/mL) (28%; $n = 31$) were selected most frequently. With a minimum methylprednisolone total dose of 40 mg (1 mL) and a maximum dose of 200 mg (5 mL), no significant difference in dosing regimen was detected between different countries. However, ECVS/ACVS surgeons would inject a higher maximum dose of methylprednisolone (200 mg = 5 mL; $n = 37$) when compared to ECVSMR/ACVSMR/ISELP sports medicine-trained veterinarians (120 mg = 3 mL; $n = 22$). The average dose of methylprednisolone (40 mg/mL) was 2.8 mL.

Triamcinolone (10 mg/mL) was preferred in Europe (46%; $n = 31$) but injected at a lower dose when compared to the United States. The maximum total dose of triamcinolone selected in Europe was 30 mg (3 mL), whereas the maximum dose was 60 mg (6 mL) in the United States. Additionally, triamcinolone was used by ECVS/ACVS surgeons (maximum 40 mg) more frequently (65%; $n = 45$) when compared to sports medicine-trained (ECVSMR/ACVSMR) veterinarians (35%; $n = 24$).

Dexamethasone (2%) was selected mainly by ISELP and sports medicine-trained veterinarians (51%; $n = 20$), at a maximum dose of 30 mg (15 mL) in Europe or 10 mg (5 mL) in the United States (for a 500 kg horse with 'kissing spines' affecting two interspinous spaces). Other corticosteroids used include betamethasone, flumethasone and isoflupredone.

Local anaesthetics

Mepivacaine 2% (58%; $n = 39$) and lidocaine 2% (53%; $n = 36$) were commonly injected, with doses ranging from 1 to 30 mL (mean volume of 9.5 mL including NaCl dilution) for two interspinous spaces. Lidocaine (4–8 mL) is more frequently used in Europe when compared to other regions ($p = 0.004$). The selected dosages are similar for the purpose of diagnostic analgesia or therapeutic local infiltration.

Homeopathic agents and other substances

Traumeel (ingredients with D2 dilution: calendula officinalis, atropa belladonna, aconitum napellus, bellis perennis, hypericum perforatum, echinacea, echinacea purpurea) with a maximal volume of 20 mL was frequently used by surgical (58%; $n = 19$) and sports medicine-trained equine veterinarians (42%; $n = 14$). Zeel (ingredients with D6 dilution: cartilago suis, funiculus umbilicalis suis, embryo totalis suis, placenta totalis suis, solanum dulcamara, symphytum officinale e radice) was, however, rarely proposed (21%; $n = 7$), with a maximal volume of 5 mL. The application of vitamins, including vitamin E or B12, was additionally described (42%, $n = 10$).

Complications following local injection

Superficial skin irritation was observed in two of 20 cases following local injection by 36% ($n = 102$) of survey respondents. Complications such as local skin infection (abscessation) (8%; $n = 24$), increased pain sensation (18%; $n = 51$) and neurological deficits

Specialists' preferences for the management of equine ORDSP

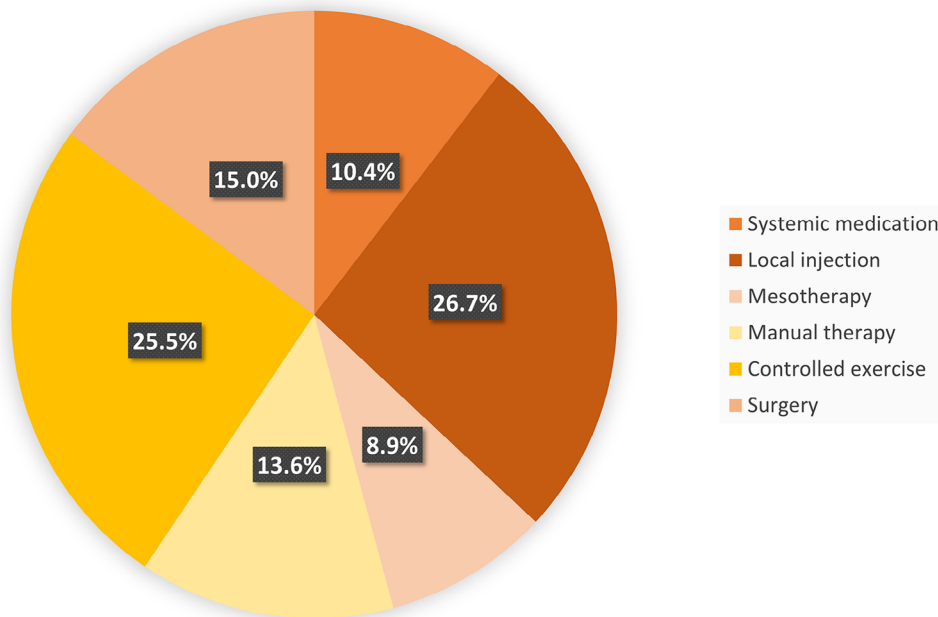


FIGURE 4 Equine orthopaedic specialists' preferences for the management of horses with overriding dorsal spinous processes (ORDSPs)

(6%; $n = 17$) were observed less often (3%–8% in two of 10 cases). Other complications, including hair discolouration ($n = 6$), local discomfort ($n = 3$), haematoma formation ($n = 2$), myositis ($n = 3$), stiffness ($n = 1$), laminitis ($n = 3$), deep infection ($n = 2$), needle breakage ($n = 1$) and lack of improvement following local injection therapy ($n = 2$), were also reported.

A highly positive correlation was detected between local skin irritation and the infiltration with methylprednisolone acetate (coefficient = 0.45) and mepivacaine (coefficient = 0.43). An increased risk of local skin reaction was also detected with an increasing dose of methylprednisolone.

Preferred treatment for ORDSP

Respondents' preferences for the management of horses with ORDSP are illustrated in Figure 4. There was an apparent trend towards the local infiltration of affected interspinous spaces. Mesotherapy appeared to be particularly popular among ISELP members (38%; $n = 43$) but was chosen less frequently by other practitioner groups (17%) ($p = 0.001$).

Manual therapy was recommended by 42% ($n = 44$) of European veterinarians and 25% ($n = 26$) of respondents working in the United States ($p = 0.01$). Similarly, controlled exercise was recommended by the majority of respondents in Europe (71%; $n = 75$), but only 41% ($n = 42$) of respondents working in the United States ($p = 0.01$).

The most popular combinations for ORDSP therapy were local injection combined with controlled exercise and surgery (9%; $n = 26$), followed by the combination application of systemic medication, local

injection, manual therapy and controlled exercise (8%; $n = 22$).

Preferences for conservative versus surgical management

The advice for surgical management as a first-line treatment once ORDSP is diagnosed was given by 18% ($n = 11$) of equine orthopaedic veterinarians working in the United States and 7% ($n = 14$) of veterinarians from Europe and other regions. Additionally, respondents from the UK and Ireland (22%; $n = 13$) were more likely to recommend surgery when compared to their colleagues working in continental Europe (1%; $n = 1$) ($p = 0.001$). However, overall, more equine orthopaedic veterinarians recommended conservative management as a first-line treatment (69%; $n = 181$) ($p = 0.001$).

Among the different veterinary specialisations, surgical management of ORDSP was considered significantly more frequently by ECVS/ACVS surgeons (15%; $n = 22$), whereas only 3% ($n = 4$) of sports medicine-trained equine orthopaedic specialists (ECVSMR/ACVSMR) would opt for surgery once the condition of ORDSP is diagnosed ($p = 0.001$).

Preferred type of surgery

Desmotomy of the interspinous ligament was the preferred surgical option for 36% ($n = 81$) of respondents, followed by a combination of desmotomy and partial ostectomy of affected dorsal spinous processes (30%; $n = 68$). Partial ostectomy was selected by 23% ($n = 51$)

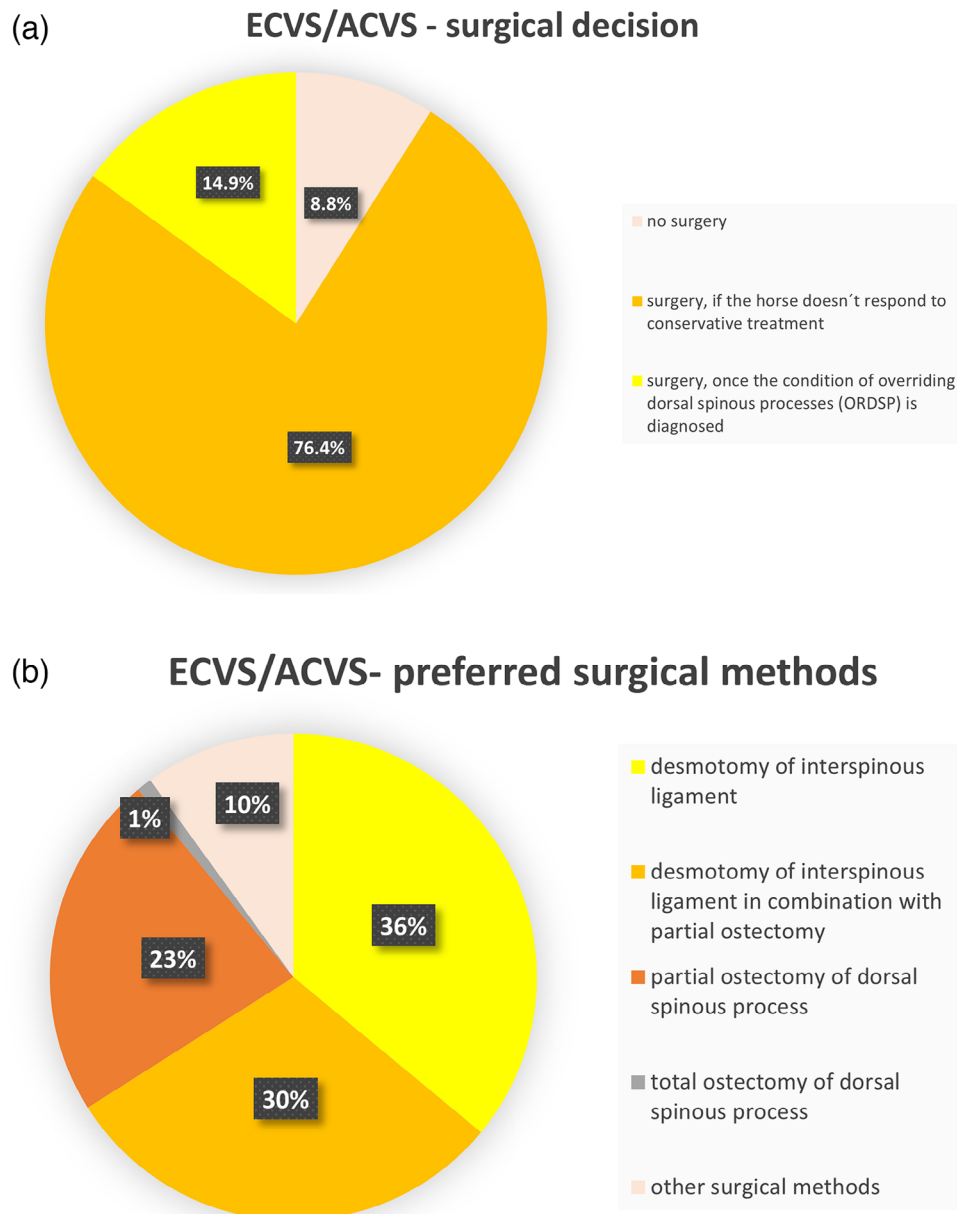


FIGURE 5 Surgical preferences selected by members of the European College of Veterinary Surgeons (ECVS) and American College of Veterinary Surgeons (ACVS). (a) Decision regarding surgical intervention. (b) Preferred surgical method

of respondents and total ostectomy was considered by 1% ($n = 3$) (Figure 5).

In the United States, desmotomy of the interspinous ligament was performed most frequently (46%; $n = 20$). Although the desmotomy was also combined with partial ostectomy in the United States (39%; $n = 17$), a partial ostectomy alone was less popular (11%; $n = 5$). In Europe, the partial ostectomy was performed more frequently (28%; $n = 29$), and the total ostectomy was chosen in Europe only (3%; $n = 3$).

DISCUSSION

Equine orthopaedic veterinarians with different training backgrounds and geographic regions of practice use variable strategies for the treatment of ORDSP. Preferences are inconsistent regarding the diagnostic steps taken, as well as the conservative or surgi-

cal options chosen for the management of ORDSP. Although local injection is commonly used among equine orthopaedic veterinarians, the injection technique, needle size, medication and volume used are operator dependent.

Radiography and ultrasonography alone are not necessarily sufficient for the assessment of the clinical relevance of ORDSP.^{5,12,29} Gamma scintigraphy and regional analgesia have been described to provide valuable information concerning active remodelling and pain associated with spinal lesions, respectively.^{7,8,10,19} In this survey, gamma scintigraphy (rarely or occasionally used by 45% of participants) and local infiltration (used by 27% of participants) are considered only by a relatively small number of specialists for the investigation of back pain.

Different techniques are favoured for the local injection of the equine thoracolumbar vertebral column for diagnostic or therapeutic purposes by equine

veterinarians. Most commonly, two needles are placed abaxial to the interspinous space or one needle is positioned axial in the midline between two dorsal spinous processes. The specificity of the abaxial approach is questionable; however, the axial approach might be hampered by new bone formation or over-riding associated with ORDSPs. Additionally, accurate injection of the interspinous space using the axial approach is generally difficult to achieve due to the density of the interspinous ligament.³⁰ Volumes used for local infiltration ranged from 1 to 30 mL per injection. Depending on the exact needle position, it has been shown that larger volumes may travel over 30 cm in a cranio-caudal direction if injected into the fascial plane between the transverse process and the erector spinae muscles.^{31,32} Particularly, when using spinal needles for the abaxial approach, the risk of diffusion along fascial planes might increase. The injection of larger volumes with additional diffusion results in non-specific injections, particularly when used to localise pain. Regional differences in the selected volume of corticosteroid injections might be explained by the withdrawal implications, which vary between Europe and the United States. However, care should generally be taken not to exceed the recommended maximum dose for injectable corticosteroids to prevent adverse side effects, especially when several interspinous spaces are medicated.³³

Interestingly, veterinary surgeons with less experience were more inclined to perform local injections of ORDSPs under imaging guidance when compared to veterinarians with more years of clinical experience. To the best of the authors' knowledge, whether imaging guidance improves the accuracy of the needle placement and which injection technique in combination with which imaging modality might be most useful for the local infiltration of ORDSPs have not been investigated in detail so far.

Among the treatment options for horses with ORDSPs, differences are observed mainly regarding the choice between conservative and surgical management as well as the use of manual therapy and exercise programs. One reason for selecting surgery as a first-line approach in the United States, UK and Ireland might be a different caseload. While ORDSPs are detected in approximately 34% of Warmblood horses, up to 92% of Thoroughbred racehorses are affected by the condition.^{1,13,14,34} The desmotomy of the interspinous ligament has been associated with a good prognosis for successful racing in Thoroughbreds, which is why it might be the preferred treatment option by a number of equine orthopaedic veterinarians.^{24,35} Manual therapy in combination with targeted exercise programs and local injection therapy appears to be favoured by continental European specialists. Additionally, a survey consulting a wider field of equine partitioners in the USA identified a higher percentage (82%) of veterinarians who reported clinical improvement of back pain following rehabilitation alone.²⁸ However, there is little published evidence for this type of treatment, which is a gap in the literature that requires to be filled.

Limitations of the study include individual bias as well as varying group sizes among different regions and specialisations. However, while a number of participants did not complete the survey, the respondents met the target group of experienced equine orthopaedic veterinarians seeing a high number of poor performance cases for back pain investigation.

CONCLUSION

Despite a growing body of evidence, the therapeutic approach to clinically relevant ORDSPs in horses is strongly influenced by professional specialisation and regional preferences. Variations in injection technique and differing criteria for surgical intervention warrant further investigation. Additional research is required in order to be able to provide guidelines or a form of consensus for the diagnosis and treatment of thoracolumbar pain associated with ORDSPs in equine athletes.

AUTHOR CONTRIBUTIONS

Anna Ehrle and Christoph Lischer designed and directed the research project. Anna Ehrle and Dorothea Treß created and distributed the questionnaire. Statistical analysis was performed by Roswitha Merle and Dorothea Treß. The manuscript was outlined by Anna Ehrle and Dorothea Treß. All authors discussed the results and contributed to the final manuscript.

ACKNOWLEDGEMENTS

The authors would like to thank April Lawson and David Stack for their contributions to the design of the questionnaire and all equine orthopaedic veterinarians who participated in the survey.

Open access funding enabled and organized by Projekt DEAL.

CONFLICT OF INTEREST STATEMENT

None of the authors has any financial or personal relationships that could inappropriately influence or bias the content of the paper.

FUNDING INFORMATION

The author(s) received no specific funding for this work

DATA AVAILABILITY STATEMENT

The datasets analysed during the current study are available from the corresponding author upon reasonable request.

ETHICS STATEMENT

The study was approved by the local Committee on Research Ethics (StN 004/19).

REFERENCES

1. Jeffcott LB. Disorders of the thoracolumbar spine of the horse—a survey of 443 cases. *Equine Vet J.* 1980;12(4): 197–210.

2. Mayaki AM, Intan-Shameha AR, Noraniza MA, Mazlina M, Adamu L, Abdullah R. Clinical investigation of back disorders in horses: a retrospective study (2002–2017). *Vet World*. 2019;12(3):377–81.
3. Denoix J-M, Dyson SJ. Thoracolumbar Spine. In: *Diagnosis and Management of Lameness in the Horse*. 2011. p. 592–605.
4. Coomer RP, McKane SA, Smith N, Vandewereld JM. A controlled study evaluating a novel surgical treatment for kissing spines in standing sedated horses. *Vet Surg*. 2012;41(7):890–97.
5. Cousty M, Retureau C, Tricaud C, Geffroy O, Caure S. Location of radiological lesions of the thoracolumbar column in French trotters with and without signs of back pain. *Vet Rec*. 2010;166(2):41–45.
6. Walmsley JP, Pettersson H, Winberg F, McEvoy F. Impingement of the dorsal spinous processes in two hundred and fifteen horses: case selection, surgical technique and results. *Equine Vet J*. 2002;34(1):23–28.
7. Zimmerman M, Dyson S, Murray R. Close, impinging and overriding spinous processes in the thoracolumbar spine: the relationship between radiological and scintigraphic findings and clinical signs. *Equine Vet J*. 2012;44(2):178–84.
8. Brown KA, Davidson EJ, Ortvad K, Ross MW, Stefanovski D, Wulster KB, et al. Long-term outcome and effect of diagnostic analgesia in horses undergoing interspinous ligament desmotomy for overriding dorsal spinous processes. *Vet Surg*. 2020;49(3):590–99.
9. Ehrle A, Ressel L, Ricci E, Merle R, Singer ER. Histological examination of the interspinous ligament in horses with overriding spinous processes. *Vet J*. 2019;244:69–74.
10. van Zadelhoff C, Ehrle A, Merle R, Jahn W, Lischer C. Thoracic processi spinosi findings agree among subjective, semiquantitative, and modified semiquantitative scintigraphic image evaluation methods and partially agree with clinical findings in horses with and without thoracolumbar pain. *Vet Radiol Ultrasound*. 2019;60(2):210–18.
11. Clayton HM, Stubbs NC. Enthesophytosis and impingement of the dorsal spinous processes in the equine thoracolumbar spine. *J Equine Vet Sci*. 2016;47:9–15.
12. Erichsen C, Eksell P, Holm KR, Lord P, Johnston C. Relationship between scintigraphic and radiographic evaluations of spinous processes in the thoracolumbar spine in riding horses without clinical signs of back problems. *Equine Vet J*. 2004;36(6):458–65.
13. Jeffcott LB. Radiographic features of the normal equine thoracolumbar spine. *Vet Radiol*. 1979;20(3-6):140–47.
14. Townsend HG, Leach DH, Doige CE, Kirkaldy-Willis WH. Relationship between spinal biomechanics and pathological changes in the equine thoracolumbar spine. *Equine Vet J*. 1986;18(2):107–12.
15. Pressanto MC, Pepe M, Coomer RPC, Pilati N, Beccati F. Radiographic abnormalities of the thoracolumbar spinous processes do not differ between yearling and trained Thoroughbred horses without perceived back pain. *J Am Vet Med Assoc*. 2023;261(6):844–51.
16. Garcia-Lopez JM. Neck, back, and pelvic pain in sport horses. *Vet Clin North Am Equine Pract*. 2018;34(2):235–51.
17. Riccio B, Frascchetto C, Villanueva J, Cantatore F, Bertuglia A. Two multicenter surveys on equine back pain 10 years apart. *Front Vet Sci*. 2018;5:195.
18. Jeffcott LB. Symposium on back problems in the horse. (2) The diagnosis of diseases of the horse's back. *Equine Vet J*. 1975;7(2):69–78.
19. Zimmerman M, Dyson S, Murray R. Comparison of radiographic and scintigraphic findings of the spinous processes in the equine thoracolumbar region. *Vet Radiol Ultrasound*. 2011;52(6):661–71.
20. Haussler KK. Equine manual therapies in sport horse practice. *Vet Clin North Am Equine Pract*. 2018;34(2):375–89.
21. Paulekas R, Haussler KK. Principles and practice of therapeutic exercise for horses. *J Equine Vet Sci*. 2009;29(12):870–93.
22. Wilson JM, McKenzie E, Duesterdieck-Zellmer K. International survey regarding the use of rehabilitation modalities in horses. *Front Vet Sci*. 2018;5:120.
23. Brink P. Subtotal ostectomy of impinging dorsal spinous processes in 23 standing horses. *Vet Surg*. 2014;43(1):95–98.
24. Derham AM, O'Leary JM, Connolly SE, Schumacher J, Kelly G. Performance comparison of 159 Thoroughbred racehorses and matched cohorts before and after desmotomy of the interspinous ligament. *Vet J*. 2019;249:16–23.
25. Desbrosse FG, Perrin R, Launois T, Vandewereld JM, Clegg PD. Endoscopic resection of dorsal spinous processes and interspinous ligament in ten horses. *Vet Surg*. 2007;36(2):149–55.
26. Jacklin BD, Minshall GJ, Wright IM. A new technique for subtotal (cranial wedge) ostectomy in the treatment of impinging/overriding spinous processes: description of technique and outcome of 25 cases. *Equine Vet J*. 2014;46(3):339–44.
27. Perkins JD, Schumacher J, Kelly G, Pollock P, Harty M. Subtotal ostectomy of dorsal spinous processes performed in nine standing horses. *Vet Surg*. 2005;34(6):625–29.
28. Marshall-Gibson ME, Durham MG, Seabaugh KA, Moorman VJ, Ferris DJ. Survey of equine veterinarians regarding primary equine back pain in the United States. *Front Vet Sci*. 2023;10:1224605.
29. Henson FM, Lamas L, Knezevic S, Jeffcott LB. Ultrasonographic evaluation of the supraspinous ligament in a series of ridden and unriden horses and horses with unrelated back pathology. *BMC Vet Res*. 2007;3:3.
30. Ramey DW, Daft B. An investigation into the feasibility of interspinous injections in the horse. *J Equine Vet Sci*. 2003;23(10):440–42.
31. Chiavaccini L, Cavalcanti M, De Gasperi D, Portela DA. Clinical efficacy of ultrasound-guided bilateral erector spinae plane block for standing lumbar spinous osteotomy in a horse. *Vet Anaesth Analg*. 2022;49(5):517–19.
32. Delgado OBD, Louro LF, Rocchigiani G, Verin R, Humphreys W, Senior M, et al. Ultrasound-guided erector spinae plane block in horses: a cadaver study. *Vet Anaesth Analg*. 2021;48(4):577–84.
33. Dutton H. The corticosteroid laminitis story: 1. Duty of care. *Equine Vet J*. 2007;39(1):5–6.
34. Haussler KK, Stover SM, Willits NH. Pathologic changes in the lumbosacral vertebrae and pelvis in Thoroughbred racehorses. *Am J Vet Res*. 1999;60(2):143–53.
35. Prisk AJ, Garcia-Lopez JM. Long-term prognosis for return to athletic function after interspinous ligament desmotomy for treatment of impinging and overriding dorsal spinous processes in horses: 71 cases (2012–2017). *Vet Surg*. 2019;48(7):1278–86.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Treß D, Lischer C, Merle R, Ehrle A. International survey of equine orthopaedic specialists reveals diverse treatment strategies for horses with overriding spinous processes. *Vet Rec*. 2024;e3899. <https://doi.org/10.1002/vetr.3899>