Indian Journal of Animal Sciences **89** (1): 15–24, January 2019/Article
https://doi.org/10.56093/ijans.v89i1.86234

Clinical occurrence and radiographic diagnosis of distal limb lameness in equine

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Received: 11 July 2018; Accepted: 6 August 2018

ABSTRACT

The objectives of this study was to evaluate the hospital occurrence of various radiographic lesions of the distal limb (bones and joints) lameness in equine and to evaluate the role of nerve and joint blocks for the localization of lameness in equine. All the equine lameness cases (117), presented during the one year study period that were subjected to radiographic evaluation, were investigated. Out of these, 20 equine lameness cases were subjected to systematic evaluation including nerve / joint blocks to confirm, whether the clinically or radiographically detected lesion was the primary cause for the lameness or not. Out of 117, 78 equine (66.67%), were diagnosed with 124 radiographic lesions involving 101 limbs. The majority (62.8%) of the equines had single radiographic lesion, whereas the remaining animals were detected with multiple lesions involving one (15.4%) or more limbs (21.8%). Majority cases of equine lameness were recorded in winter season. Highest per cent lesions were recorded in hoof region (25.81%) with more common involvement of fore feet (68.75%) and in mares (54.54%). Hock and fetlock regions were second (22.6%) and third (21.8%) most common regions for occurrence of equine lameness. Fetlock joint of hindlimb (63%) was more commonly affected than that of the forelimb. In this study, 16 nerve / joint blocks were applied in 15 horses and these were found helpful in confirming the lameness lesions in 66.7% cases. In conclusion, high prevalence of multiple lesions involving one or more limb poses great diagnostic challenge. Forelimb hoof and the hock were most frequently involved in distal limb lameness in equine. Periostitis and arthritis were most prevalent lameness causing lesions in equine. Physical examinations, nerve/ joint bocks and radiography complement each other in confirming the site of lesion causing lameness.

Key words: Horse, Lameness, Local anaesthetic, Nerve block, Radiography, Seasonal occurrence

Lameness is one of the most economically important medical conditions affecting horses and is a frequent reason for decreased performance in horses (Hammarberg *et al.* 2016). Accurate localization of the nature and site of lesion causing lameness is not only essential for diagnostic purpose but is also an essential first step for institution of effective treatment (Pfau *et al.* 2014).

Application of diagnostic analgesia is a fundamental concept in lameness diagnosis to localize the source of pain (Ross and Dyson 2011). Radiography remains the cornerstone of diagnostic imaging technique for the evaluation of the musculoskeletal disorders. After localization of lameness by means of physical examination and diagnostic nerve and/or joint blocks, survey radiographs can quickly and accurately provide morphologic characterization of bone and soft tissue abnormalities which concurrently lead to formation of a definitive or differential diagnosis (Vallance *et al.* 2012).

Distal limb has been mostly commonly affected with lameness in equine (Brommer *et al.* 2003, Vanderperren *et al.* 2009). Nature and site of the lameness causing lesions may vary depending upon the purpose a horse is being used e.g. breeding, racing, vigorous work or pleasure riding. Moreover, season may have influence on the occurrence of lameness in horses. Therefore, this study was designed with the objectives to evaluate the hospital occurrence of various causes of the distal limb (bones and joints) lameness, radiographically, in equine. Also to evaluate the role of nerve and joint blocks for the localization of distal limb lameness in equine.

MATERIALS AND METHODS

All the equine lameness cases (117), presented during the one year study period that were subjected to radiographic evaluation, were investigated to record the hospital occurrence of various radiographic lesions of the distal limb (bones and joints) lameness in equine. The hospital occurrence of lameness was worked out in relation to region of limb involved, age and gender.

Out of these, 20 equine suffering from lameness were

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evaluated by systematic evaluation. It included examination of various regions of the limb by palpation and manipulation to identify swellings, painful areas such as evaluation of hoof pain using hoof tester examination. Flexion tests of fetlock, carpal and tarsal joint (spavin test) were also done to locate the site of pain (Fig. 1). On the basis of the examination of equine at rest and exercise, the scoring of lameness was done using AAEP grading system (1 to 5) for evaluating equine lameness (Ross and Dyson 2011).

Nerve/Joint block: Nerve / joint blocks were given to confirm, whether the clinically or radiographically detected lesion was the primary cause for the lameness or not. The nerve/joint blocks were employed in obviously lame horses, i.e. horses with lameness grade of 4 to 5 (Ross and Dyson 2011). All the lame horses were evaluated in various gaits before and after the nerve / joint block and video recording was done so as to confirm location of the lameness in the distal limb. The various nerves (such as palmer digital, abaxial and low four point nerve block) / joint blocks (such as carpal and tarsal joint) were performed using 0.5% bupivacaine or 0.75% ropivacaine as per the standard procedures (Will Barker 2016).

RESULTS AND DISCUSSION

During the study period of one year, a total of 117 cases of equine lameness that were subjected to radiographic examination to identify the cause of lameness, were investigated. Among these, 78 equine (66.67%), with a mean age of 7.50±4.14 year, had one or more radiographic lesions. So, the 78 equine were diagnosed with 124 radiographic lesions involving 101 limbs (Table 1).

Majority equine suffering from lameness were females (59.83%, 70) followed by males (36.75%, 43) and mules (3.42%, 4). Earlier studies by Mistry *et al.* (2012) and Varshney (1997) also reported a high incidence of lameness in females. Whereas Cogger *et al.* (2008) found no difference in the relative occurrence of lameness between male and female groups in general. Higher incidence of lameness in female animals in present study might be due to population difference prevalent in this region. In forelimb, the hoof and in hindlimb, the hock were the most commonly involved regions in equine lameness. Similarly, Mistry *et al.* (2012) reported that the incidence of foot affections were highest followed by hock and fetlock joint disorders whereas Halder and Samar (2006) reported that carpal and fetlock joints were most frequently affected.

Table 1. Region wise radiographic occurrence of lameness in equine

Region affected	No. of limbs	No. of lesions and Percent	Mean Age±SD	Age range
Hoof region	22	32 (25.81%)	7.91±4.45	2–16 year
Pastern Joint region	13	17 (13.71%)	11.08±4.35	2–18 year
Fetlock Joint region	24	27 (21.77%)	8.50±4.40	1–16 year
Metacarpal and Metatarsal region	10	11 (8.87%)	7.71±5.69	20 days-13 year
Carpal Joint region	7	9 (7.26%)	8.29±5.22	1–15 year
Hock Joint region	25	28 (22.58%)	7.77±3.61	1-13 year
Total	101	124 (100%)	7.50±4.14	20 days-18 year

Fig. 1. Hoof tester examination (**a**), Flexion of carpal joint (**b**), Spavin test (**c**), Hock extension test (**d**).

Among 78 animals, majority (49, 62.8%) of the equine lameness cases had single radiographic lesion whereas the remaining animals (29) were detected with multiple lesions involving one (12, 15.4%) or more limbs (17, 21.8%). Presence of multiple lesions in an animal involving single or multiple limbs suggests poor awareness of equine owners of this region towards lameness. Besides animal welfare issue it also poses a great diagnostic and decision making challenge for equine practitioner. Broster *et al.* (2009) also reported an alarming prevalence of multi-limb lameness associated pain in working horses in developing countries like India and Pakistan.

Lameness was found to be well distributed throughout the year; however, highest incidence was recorded in October followed by July, April (Table 2). It might be due to longer duration of winter season in the North-West region of India. Varshney (1997) reported more incidences of lameness in August, September and October. In this study,

high incidences of lameness were found in winter as compared to monsoon and summer which was contrary to Mistry *et al.* (2012) who reported a slightly higher incidence of equine lameness (37.50%) in summer followed by monsoon and winter each reporting equal incidence (31.25%). Also Kane *et al.* (2000) reported that foot problems were most common cause of lameness in summer season.

Table 2. Classification of lameness according to season of year

Month	No. of cases	Per cent	Season
July	10	12.82	Monsoon (24, 30.77%)
August	7	8.97	
September	7	8.97	
October	12	15.38	Winter (33, 42.31%)
November	4	5.13	
December	5	6.41	
January	2	2.56	
February	5	6.41	
March	5	6.41	
April	8	10.26	Summer (21, 26.92%)
May	6	7.69	
June	7	8.97	

Hoof affections: In this study, hoof lesions were most frequent (25.81%) which comprised 21.78% (22/101) of total affected limbs (Table 3). Dabareiner *et al.* (2005) also found forelimb foot pain being the most common musculoskeletal problems in racing horses. Fore feet (68.75%, 22/32) were more commonly involved than hind feet (31.25%, 10/32) which corroborate to the findings of Ragab *et al.* (2010).

Among various hoof affections, laminitis (14/32, 43.75%) was observed in majority of the cases (Fig. 2d) with a mean age of 8.67±4.82 year with greater number reported in fore feet (85.71%, 12/14) as compared to hind feet (2/14; 14.29%); 66.67% (6/9) were females and 33.33% (3/9) were males. In overall, hoof disorders were recorded more in females (54.54%, 12) as compared to male animals (45.45%, 10). Kane *et al.* (2003) reported that laminitis,

Table 3. Occurrence of various radiographic hoof lesions in equine

Conditions diagnosed (22)	Limbs (32)		Gender		Age (year) (Mean± SD)	Range (year)
	Fore	Hind	M	F		
Laminitis (9)	12	2	3	6	8.67±4.82	4 to 16
Hoof fracture/split (3)	3	0	2	1	4.33±1.53	3 to 6
Low Ring Bone (4)	3	1	1	3	9.50±4.80	5 to 16
Solar Abscess (2)	0	2	2	0	6.50±6.36	2 to 11
Periosteal Reaction (1)	0	1	1	0	10.00±0	10
White Line disease (1)	2	2	0	1	13.00±0	13
Navicular disease (1)	0	2	0	1	6.00±0	6
Bilateral dislocation of coffin joint (1)	2	0	1	0	3.00±0	3
Total	22	10	10	12	7.91±4.45	2 to 16

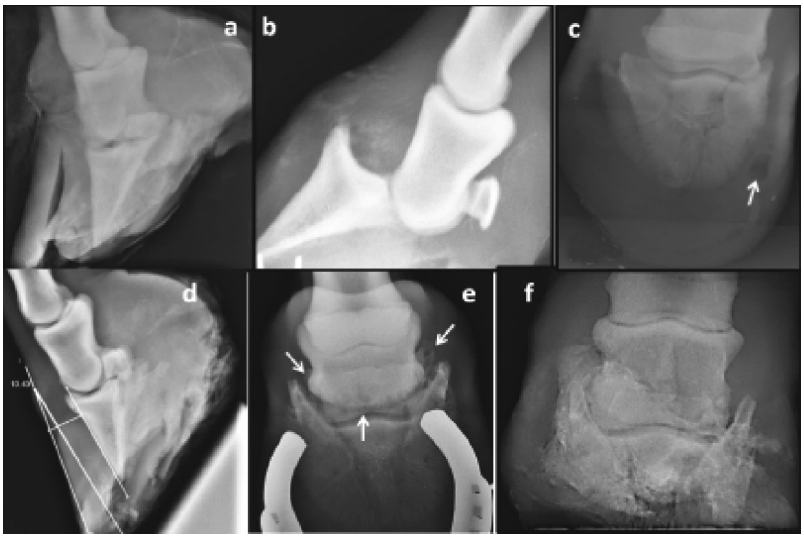

Fig. 2. Radiographs of various hoof affections. (**a**) Lateral radiograph showing hoof wall split, (**b**) Lateral radiograph showing dislocation of coffin joint, (**c**) Dorso-plantar radiograph showing a smooth marginated, radiolucent defect in the solar region suggestive of solar abscess, (**d**) Lateral radiograph showing laminitis with severe rotation of coffin bone, (**e**) Dorso planter radiograph showing proliferative bone reaction and lytic changes in the navicular bone suggestive of navicular disease, (**f**) Dorso-palmer radiograph showing bone reaction in coffin joint.

navicular disease, and sole bruises or abscesses were the most common causes of foot problems which together account for 70–80% of the foot problems reported in any season. However, Slater *et al.* (1995) reported no significant associations between age, breed, sex or weight and the occurrence of acute laminitis but horses with chronic laminitis were significantly older and more females tended to be affected.

Solar abscess (Fig. 2c) lesion was recorded in hind foot of 2 male horses only. However, Stephenson (2011) stated that the fore feet were more often affected than the hind feet and the white line was the usual point of entry in unshod horses. Moreover, radiography was the most commonly used diagnostic technique for solar abscess that reveals a smoothly marginated, radiolucent defect in the solar margin of the distal phalanx (Redding and Grady 2012). Bilateral dislocation coffin joint (Fig. 2b) and hoof split (Fig. 2a) cases were only reported in forelimb while solar abscess and periosteal reaction (Fig. 2f) were only reported in males. Navicular disease was diagnosed in one case which was bilateral in hind feet (Fig. 2e). Wright (1993) stated that navicular disease is most frequently reported in fore feet and 78% of horses were bilaterally affected.

Pastern region affections: In the pastern region, a total of 17 radiographic lesions were recorded in 13 equine (Table 4). Among these, high ring bone (Fig. 3a, b) was recorded in a maximum number of cases (69.23%, 9/13) with a mean age of 11.08±4.35 year. Abdel-Hady *et al.* (2017) reported that high and low ring bone lesions were most prevalent in donkeys. The high incidence of ring bone may be due to the fact that low motion joints such as proximal interphalangeal, are vulnerable to the development of osteoarthritis because they have a relatively smaller area of joint surface that must sustain the same weight-bearing load for a relatively longer period of time during joint movement (Pool and Meagher 1990). Majority of the animals affected with high ring bone (66.67%, 6/9) were male and forelimb were more commonly affected (66.67%, 8/12). Similarly, Semieka and Ali (2012) reported ringbone to be the most common osteophytes affecting foot of hard working donkeys and recorded more common occurrence in the thoracic limbs. In overall, pastern region affections were recorded more in males (61.54%, 8/13) and in forelimb (70.59%, 12/17). Dislocation at pastern joint (Fig. 3c) was only recorded in forelimb of 2 equine, with one having bilateral.

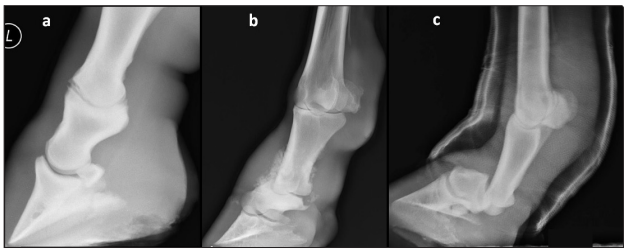

Fig. 3. Radiographic presentation of various affections of Pastern region. (**a**) Lateral radiograph of pastern joint showing decreased joint space depicting high ring bone, (**b**) Lateral radiograph of pastern joint showing periosteal reaction in and around the pastern joint depicting high ring bone and partial luxation of P1 from P2, (**c**) Lateral radiograph of pastern joint showing dislocation of P1 from P2.

Fetlock region affections: In this study, a total of 27 lesions were recorded in 24 fetlock region with a mean age of 8.50±4.41 year (Table 5) which comprised 21.77% of

Table 4. Occurrence of various radiographic lesions of Pastern joint region in equine

Conditions diagnosed (13)	Limbs (17)		Gender		Age (year) (Mean±SD)	Range (year)
	Fore	Hind	M	F		
High ring bone (9)	8	4	6	3	11.56±3.81	6 to 18
Periosteal reaction / Lysis (2)	1	1	1	1	9.00±9.90	2 to 16
Dislocation at pastern joint (2)	3	0	1	1	11.00±1.41	10 to 12
Total	12	5	8	5	11.08±4.35	2 to 18

Table 5. Occurrence of various radiographic lesions of Fetlock region in equine

Conditions diagnosed (24)	Limbs		Gender		Age (Year) (Mean±SD)	Range (year)
	Fore	Hind	M	F		
Proximal sesamoiditis (7)	2	5	3	4	9.86±4.45	5 to 16
Soft tissue swelling / calcification (3)	2	2	0	3	4.33±2.08	2 to 6
Osslets (6)	4	4	0	6	8.17±4.40	4 to 16
Periosteal reaction (4)	0	4	2	2	9.00±1.00	8 to 16
Chip fracture at dorso-proximal aspect of first phalanx (2)	2	0	0	2	10.00±8.49	4 to16
Bone chip (1)	0	1	1	0	9.00±0	9
Fracture of first phalanx (1)	0	1	1	0	2.00±0	2
Total	10	17	7	17	8.50±4.41	1 to 16

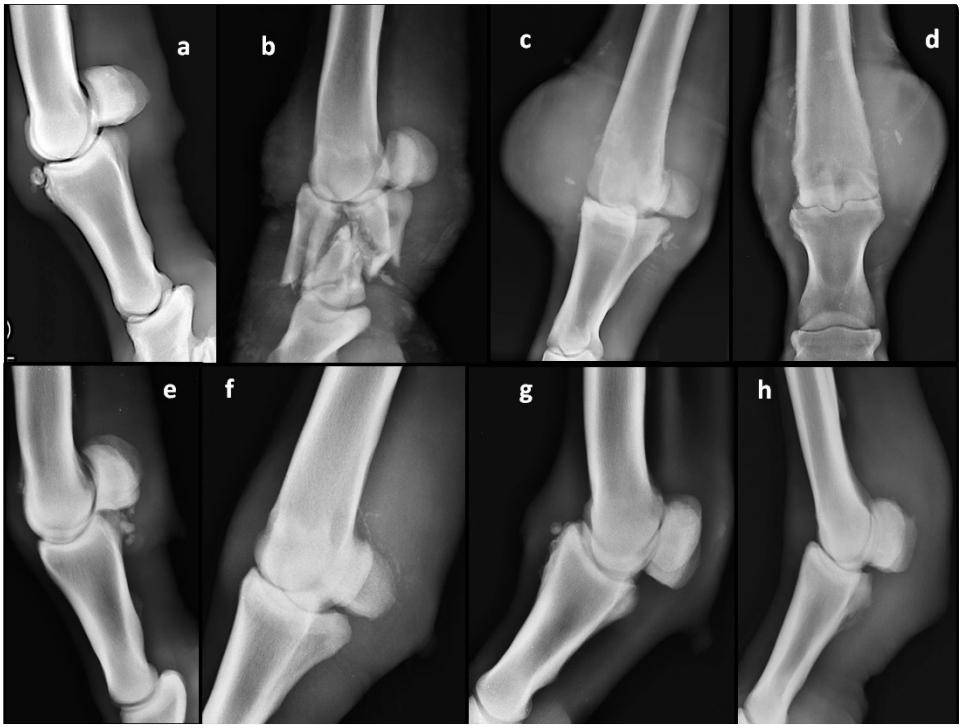

Fig. 4. Radiographic lesions of various affection of fetlock joint region. (**a**) Lateral radiograph showing a chip fracture at dorso-proximal aspect of first phalanx, (**b**) Lateral radiograph showing a comminuted fracture of third phalanx extending upto the fetlock joint, (**c**) and (**d**) Lateral and dorso-plantar radiographs showing persiosteal reaction and many small bone chips/calcification that were associated with massive soft tissue swelling, (**e**) Lateral radiograph showing severe periosteal reaction at distal aspect of proximal sesamoid in the fetlock joint and at dorso-distal aspect of metatarsal depicting osslets, (**f**) Lateral radiograph showing periosteal reaction at proximal aspect of proximal sesamoid depicting proximal sesamoiditis associated with soft tissue swelling around the joint, (**g**) Lateral radiograph showing a chip fracture and cranio-proximal aspect of 1st phalanx, (**h**) Lateral radiograph of fetlock joint showing periosteal reaction at plantar aspect of proximal sesamoid and planter-proximal aspect of first phalanx depicting proximal sesamoiditis.

Table 6. Occurrence of various radiographic lesions of metacarpal/metatarsal region in equine

Conditions diagnosed (11)	Limbs (11)		Gender		Age (Year) (Mean±SD)	Range
	Fore	Hind	Male	Female		
Splint bone fracture (6)	1	5	2	4	7.67±6.06	1 to 12 y
Cyst in distal metatarsal (1)	0	1	0	1	20 days	20 days
Metatarsal reaction / Bone Lysis (4)	0	4	0	3	10.33±3.79	6 to 13 y
Total	1	10	2	8	7.71±5.69	20 d to 13 y

Table 7. Occurrence of various radiographic lesions of carpal joint in equine

Final diagnosis	Lesions	Gender			Age (year)	Range (year)
		Male	Female	Mule	(Mean±SD)	
Carpal Osteoarthritis (5)	6	0	4	1	9.40±5.03	4 to 15
Epiphysitis (1)	2	0	1	0	1.00±0	1
Soft tissue swelling (1)	1	1	0	0	10.00±0	10
Total (7)	9	1	5	1	8.29±5.22	1 – 15

total radiographic lesions recorded (Table 1). Among these, proximal sesamoiditis lesions were recorded in maximum number (25.93%, 7/27) with a mean age of 9.86±4.45 year. Out of total 24 cases diagnosed with pastern region, more were females 70.83% (17/24) than of males 29.17% (7/24). Osslets and chip fracture at dorso-proximal aspect of the first phalanx were recorded only in females that comprised of 25% (6/24) and 8.33% (2/24), respectively. Hindlimb (62.96%, 17/27) were more commonly affected than forelimbs (37.04%, 10/27) among all fetlock region lesions. Brommer *et al.* (2003) reported that traumatic injuries and degenerative joint disease lesions occur more frequently in

the metacarpophangeal/ metatarsophalangeal (fetlock) joint in the horse than in any other.

Metacarpal/metatarsal region affection: In this study, a total of 11 (8.87%) radiographic lesions of metacarpal / metatarsal region were recorded in 10 animals (Table 6). Among these, Splint Bone fracture lesion was recorded in maximum number of cases (54.54%, 6/10) with a mean age of 7.67±6.06 year. Only females (100%) were recorded to have metatarsal region affections. In contrast, Verschooten *et al.* (1984) reported high incidence of splint bone fracture in forelimb.

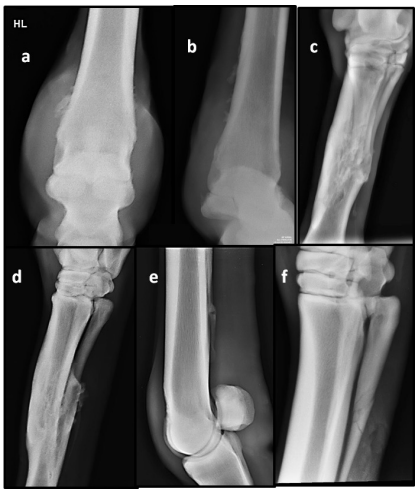

Fig. 5. Radiographic affection of metatarsal/carpal region. (**a**) and (**b**) Dorso-plantar and lateral radiographs showing periosteal reaction around the distal metatarsal with soft tissue swelling, (**c**) and (**d**) Lateral radiographs showing severe bony reaction and lysis in the mid metatarsal region and splint bone suggestive of osteomyelitis, (**e**) Lateral radiograph showing fracture of distal splint bone, (**f**) Multiple non-displaced fracture.

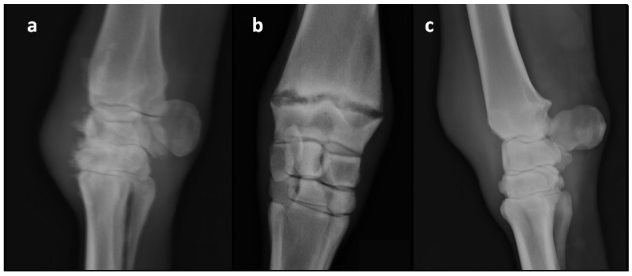

Fig. 6. Radiographic presentation of various affections of Carpal joint region. (**a**) Lateral radiograph showing severe bony reaction with reduced joint space and soft tissue swelling suggestive of osteoarthritis, (**b**) Antero-posteriorview showing an irregular radiolucent zone in the region of distal epiphysis of radius depicting Epiphysitis, (**c**) Lateral radiograph showing soft tissue swelling at the cranio-proximal aspect of the carpal joint (hygroma).

Carpal region affections: In this study, a total of 9 radiographic lesions were recorded in 7 cases of carpal region with a mean age of 8.29±5.22 years (Table 7) which comprised of 7.26% of the total affections recorded. Among these, carpal osteoarthritis lesion was recorded in a maximum number (66.67%, 6/9) with a mean age of 9.40±5.03 year. One case was of carpal osteoarthritis, and another was of epiphysitis that was bilateral. Out of total affections of carpal region highest per cent occurrence was recorded in females (66.67%) followed by males and mules which comprised of 16.67% each. Dabareiner *et al.* (2005) also reported maximum number of carpal osteoarthritis among carpal joint affections.

Hock region affections in equine: In this study, a total of 28 radiographic lesions were recorded in 25 affections of hock region with a mean age of 7.77±3.61 year (Table 8) which comprised 22.58% of the total affections recorded

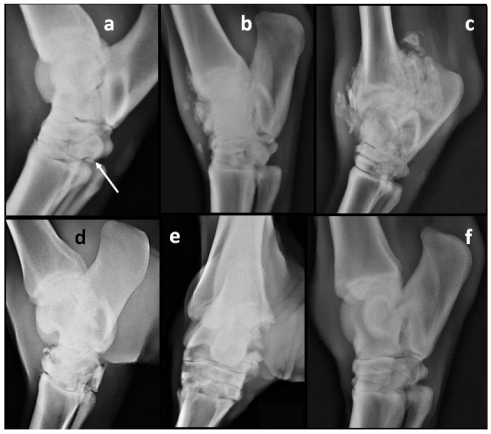

Fig. 7. Radiographs showing affections of hock joint. (**a**) Lateral radiograph showing a bone chip between the distal row of tarsal and proximal metatarsal region, (**b**) and (**c**) Lateral radiograph showing severe periosteal reaction and bony chips in the hock joint depicting hock osteoarthritis, (**d**) and (**e**) Lateral and dorso-plantar radiographs showing severe periosteal reaction, bone chip with reduced joint space and soft tissue swelling on the planter-medial aspect, (**f**) Lateral radiograph showing soft tissue swelling at the cranial aspect of hock joint that was associated with septic arthritis.

Table 8. Occurrence of various radiographic lesions of hock region in equine

Conditions diagnosed (25)	Lesions (28)	Gender			Age (year)	Range (year)
		M	F	Mule	(Mean±STD)	
Hock osteoarthritis (11)	13	4	6	1	8.42±4.21	3 to13
Reduced Joint Space/ Joint Effusions (5)	5	3	2	0	9.60±2.97	5 to 13
Bone Spavin (3)	3	0	3	0	6.67±1.53	5 to 8
Soft tissue swelling (4)	5	0	3	1	6.50±1.91	5 to 9
Bone chip (1)	1	1	0	0	6.00±0	6
Cyst in 3rd row of tarsal (1)	1	0	1	0	1.00±0	1
Total	28	8	15	2	7.77±3.61	1 to 13

Table 9. Results of various palpation and manipulative tests

Palpation/ Manipulation	Final diagnosis	Effect
Hoof tester examination (5)	Solar abscess	Positive on medial aspect of Hoof near the toe region
	Foot puncture	Positive on lateral aspect
	Navicular disease	Negative
	White Line disease	Negative
	Solar abscess	Negative
Spavin test (3)	Bone spavin	Positive
	Bone spavin	Positive
	Bone spavin	Positive
Flexion test (2)	Carpal osteoarthritis	Animal was unable to flex right carpal joint
	Carpal hygroma	Negative
Palpation (10)	Bony Chip in Hock Joint	Feels pain on palpation of joint
	Septic arthritis	Soft swelling felt at medial side of joint
	High ring bone	Hard growth felt on both forelimb fetlock joint
	Bone spavin	Hard painful swelling at hock joint
	High ring bone	No swelling or pain felt
	Foot puncture	Swelling at coronet region on lateral side of left fore foot
	Bony reaction in	Massive hard swelling at both medial and lateral side of hock joint
	Hock joint	Animal felt pain while palpating the hock joint
	Cutaneous infection	Bruising seen at the skin region of first and second phalanx
	Proximal sesamoiditis	Marked swelling at right hind fetlock
	High nerve injury	No pain on palpation of any region on the limb
		Dorsiflexion test was positive

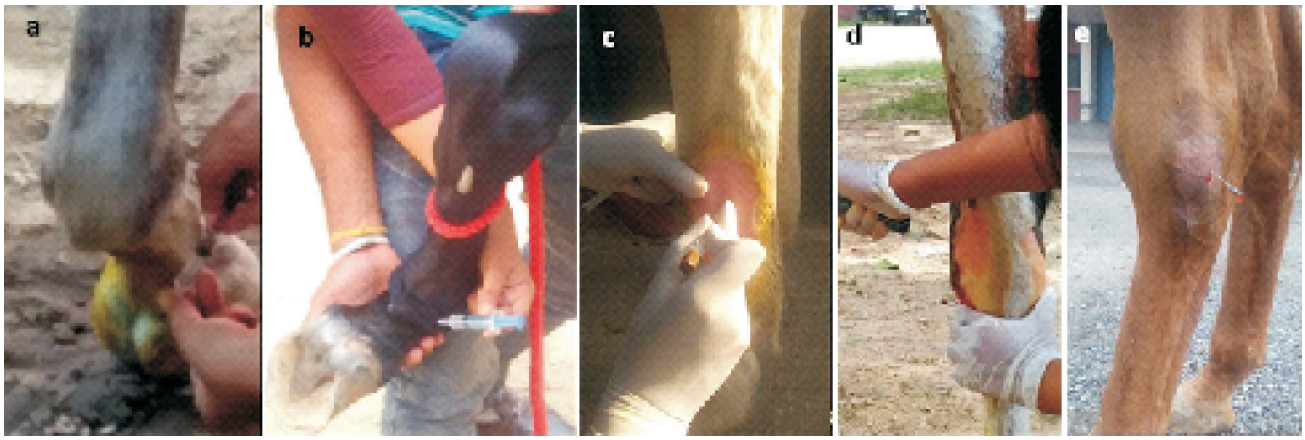

Fig. 8. Position of needle for various Nerve /Joint blocks. (a) Palmar Digital nerve block, (b) Abaxial Sesamoid nerve block, (c) Low four point nerve block, (d) Dorso-medial site for tarso-crural joint block, (e) Plantero-lateral site for distal metatarsal joint block.

(Table 1). In this study, hock was the second most commonly affected region for equine distal limb lameness. Among these, hock joint osteoarthritis lesions were recorded in maximum number (46.43%, 13/28) with a mean age of 8.42±4.21 year. Similar findings had been reported by Dabareiner *et al*. (2005). Out of total 25 affections, highest number of lesions were recorded in females 60% followed by males 32% and mules 8%. Lesions of bone spavin 10.71% (3/28) and Bone chip 3.57% (1/28) in hock joint affections was only recorded in females which corroborate to earlier reports (Oliveira and Braga 2010). Hock regions affections comprised of greatest number of affection recorded in hind limb region similar findings reported by Vanderperren *et al*. (2009) who stated that the equine tarsus was the most commonly affected hind limb region associated with lameness.

Palpation and manipulative tests: The results of the palpation and manipulative tests have been presented in the Table 9. Hoof tester examination was useful in 2 out of 5 cases having hoof lesions and was negative in case of navicular disease which corroborated to earlier findings Wright (1993) who stated that only 11% equine suffering from navicular disease, responded to the use of hoof testers. Spavin test was positive in all three cases with bone spavin. Palpation findings in ten lesions also helped in localization of the lesion. Chronic lesions become obvious due to changes in the adjoining tissues, thus may be detected easily on palpation or manipulative tests.

Grade of lameness: No case of Grade 3 lameness was reported in presented study. In this study, the lameness grade

varied with the severity / chronicity of the lesion causing lameness (Table 10). In general, the grade of lameness varies with nature and severity of the lesion. Hoogmed *et al.* (2003) concluded that for the navicular bone and distal phalanx, higher grades were associated with lameness. In contrast, higher grades in the tarsus were less likely to be associated with radiographic lesions. Broster *et al* (2009) reported that among multi-limb lame horses, 87% had at least one limb scoring 3 or 4 on the lameness scale.

Table 10. Grade wise distribution of equine lameness cases

Grade	Final Diagnosis	No. of cases	Total
Grade 1	Hock Joint Effusions	1	2
	Carpal Hygroma	1	
Grade 2	Septic arthritis at Hock	1	4
	Bony chip at Fetlock	1	
	High Ring Bone	1	
	Navicular Disease	1	
Grade 3	Nil	0	0
Grade 4	Solar Abscess	2	9
	White Line Disease	1	
	Bone spavin	2	
	Soft tissue infection	1	
	Hock Osteoarthritis	1	
	Foot Puncture	1	
	Carpal Osteoarthritis	1	
Grade 5	High nerve injury	2	5
	Bone spavin	1	
	Proximal sesamoiditis	1	
	Bone chip at Hock joint	1	

Limbs and joints involved in lameness: The details of the limb and joint involved in 20 cases of equine lameness have been shown in Table 11. In 20 cases of equine lameness, a total of 27 limbs and 17 joints were diagnosed to have lesionswhich includes 66.67% (18/27) of hindlimb affections and 33.33% (9/27) of forelimb affections. They were classified in the group of joints Coffin, Pastern, Fetlock, Hock, Carpal and others (includes lesions other than joints) from up to down and in the group of limbs involved as right or left forelimb and hindlimb. It was observed that left hindlimb (n=11, 39.28%) was most commonly affected followed by the right hindlimb, the right forelimb and the left forelimb. Whereas in contrast to our findings, Dabareiner *et al.* (2005) found that right forelimb was most commonly affected, followed by the left forelimb, the left hindlimb and the right hindlimb. In 26% horses, both forelimbs were affected, and in 5%, both hindlimbs were affected. The most common musculoskeletal problems were reported in forelimb foot pain only (33%) and osteoarthritis of the distal tarsal joints (14%).

Nerve/Joint block: In this study, 16 nerve / joint blocks were used in 15 cases of horses for confirming a lesion (Table 12). Nerve / joint block helped to completely abolish or reduce the symptoms of lameness in majority of the cases (n=10; 66.7%). A negative response in 2 among the remaining (n=6) cases also helped in diagnosis as these were

Table 11. Limbs and joints involved in distal limb lameness of equine

Joint involved	Final diagnosis	Limbs involved					
		Forelimb (9)		F.L. Total	Hindlimb (18)		H.L. Total
		Rt (5)	Lt (4)		Rt (7)	Lt (11)	
Coffin (2)	Navicular disease	0	0	0	1	1	2
				0			2
Pastern (1)	High Ring Bone	1	0	1	0	0	0
				1			0
Fetlock (5)	Osslets	2	1	3	0	0	0
	Bone chip	0	0	0	0	1	1
	Proximal Sesamoiditis	0	0	0	1	0	1
				3			2
Hock (7)	Bony chip				1	0	1
	Hock osteoarthritis				0	1	1
	Septic Arthritis				0	1	1
	Hock joint effusions				0	1	1
	Bone Spavin				1	2	3
							7
Carpal (2)	Carpal Osteoarthritis	1	0	1			
	Carpal Hygroma	0	1	1			
				2			
Others (10)	Solar Abscess	0	0	0	1	1	2
	High Nerve Injury suspected	0	0	0	1	1	2
	White Line Disease	1	1	2	1	1	2
	Foot Puncture	0	1	1	0	0	0
	Soft tissue infection	0	0	0	0	1	1
				3			7
Total		5	4	9	7	11	18

Table 12. Nerve and joint blocks applied

Nerve/Joint Block	Disease	Effect
Palmar Digital Nerve Block	Navicular Disease	Partial
Low Four Point Nerve Block	Navicular Disease	Partial
Abaxial Sesamoid Nerve Block	Solar Abscess	Yes
	Solar Abscess	Partial
	Proximal Sesamoiditis	No
	High Nerve Injury	No
	High Nerve Injury	No
	Cutaneous Infection	Yes
	White Line Disease in all foot	No
	Foot Puncture	No
Hock Joint Block	Bone chip in Hock Joint	Yes
	Septic Arthritis	No
	Bone Spavin	Yes
	Bone Spavin	Yes
	Bone Spavin	Yes
Carpal Joint Block	Carpal Osteoarthritis	Yes

found to be cases of high nerve injury based on neurological examination. Whereas in the remaining 4 animals, nerve/ joint block was not found useful in localising a lesion. This might be due to the presence of multiple lesions in the same or more than one limb e.g. laminitis and white line disease; septic arthritis case because of acute infection there was degradation of local anesthetic in the joint; or in cases of high nerve injury or technical failure. Lopez-Sanroman *et al.* (2003) stated that the failure or partial failure of a local block may occur for several reasons; the most common reasons may be aberrant nerve supplies, incorrect anatomic deposition, inadequate anesthetic volume, dilution or hemodilution of anesthetic agent, and presence of fibrous connective tissue inhibiting diffusion of anesthetic agents. Cook and Singer (2009) stated a relationship between clinical presentation, diagnostic and radiographic findings and outcome in horses with osteoarthritis of the small tarsal joints that response to intra-articular anaesthesia that was described as a gold standard for the diagnosis of Bone Spavin.

From this investigation, it can be concluded that high prevalence of multiple lesions involving one and/or more limb(s) poses the great diagnostic challenge. The forelimb hoof and the hock are most frequently involved in distal limb lameness in equine. Periostitis and arthritis are most prevalent lameness causing lesions in equine. Physical examinations, nerve/ joint bocks and radiography complemented each other in confirming the site of lesion causing lameness.

ACKNOWLEDGEMENTS

Authors are thankful to Indian Council of Agricultural Research, New Delhi for financial support under ICAR 22, 'All India Network Program on Diagnostic Imaging and Management of Surgical Conditions in Animals'. Authors also acknowledge Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab, India for providing necessary facilities to conduct this study.

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