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Clinical evaluation of coxofemoral neurectomy for pain management in canine hip dysplasia

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Abstract
Canine hip dysplasia (CHD) is a progressive orthopaedic disorder leading to osteoarthritis and chronic pain, severely affecting mobility and quality of life. This study evaluated the efficacy of coxofemoral neurectomy for pain alleviation in dogs with CHD. Six dogs diagnosed radiographically with hip dysplasia and exhibiting chronic lameness unresponsive to conservative management were selected. The procedure involved selective transection of articular nerve branches innervating the hip joint. Post-operative evaluations were performed on Days 0, 15, 30 and 60 to assess clinical improvement, haematological and biochemical parameters, radiographic stability and pain scores using UMPS and GCPS. Significant improvement in gait and weight-bearing was observed from Day 15 onwards. Radiographic findings indicated maintenance of joint congruity without degenerative progression, while haematological and biochemical values remained within physiological limits. Coxofemoral neurectomy proved to be a minimally invasive and effective technique for pain mitigation in moderate CHD cases where femoral head ostectomy or total hip replacement may not be feasible.

Keywords: Canine hip dysplasia, coxofemoral neurectomy, pain management, osteoarthritis, denervation

Introduction
Canine Hip Dysplasia (CHD) is a multifactorial orthopaedic disorder characterized by abnormal development and laxity of the coxofemoral joint, leading to subluxation and osteoarthritis [1]. It commonly affects large breeds such as German Shepherds, Rottweilers and Labradors. Conservative management includes weight control, physiotherapy and chondroprotective agents like glucosamine, chondroitin sulphate and sodium pentosan polysulfate (NaPPS) to reduce inflammation [2]. However, efficacy declines in advanced cases requiring surgical intervention. Femoral head ostectomy (FHO) and total hip replacement (THR) yield definitive results but are invasive, costly and demand long rehabilitation [3]. Coxofemoral neurectomy, in contrast, is a selective denervation procedure that interrupts articular branches from the femoral, obturator, cranial gluteal and sciatic nerves [4], thereby blocking nociceptive input and providing effective pain relief. The present study evaluated the clinical, haematological, biochemical, radiographic and analgesic efficacy of this technique in hip dysplastic dogs.

Materials and Methods
Six dogs of various breeds and sexes diagnosed with CHD were selected. Diagnosis was confirmed by orthopaedic examination and ventro-dorsal pelvic radiography.
Each animal was prepared aseptically by clipping and scrubbing the operative site with chlorhexidine gluconate and povidone-iodine solution. The dogs were positioned in lateral recumbency with the affected limb uppermost.
A standardized anaesthetic protocol was used: premedication with atropine (0.04 mg/kg, i.m.) and buprenorphine (0.01 mg/kg, i.m.), followed by induction with ketamine-diazepam combination and maintenance with isoflurane. Ringer’s lactate was administered intravenously throughout the procedure to maintain hydration. Vital parameters including heart rate, respiration rate, and SpO_2 were continuously monitored.

Surgical technique: A craniolateral approach was made from the cranial aspect of the greater trochanter towards the cranial iliac spine. The fascia lata was incised, and the superficial and middle gluteal muscles were retracted to expose the deep gluteal muscle. The deep gluteal was incised to expose the cranio-dorsal acetabular rim. Circumferential periosteal stripping was performed around the cranial and dorsal acetabular margins using a bone curette to severe sensory nerve endings arising from the cranial gluteal, femoral, and sciatic nerves. Haemostasis was achieved with electrocautery, and closure was performed in anatomical layers using absorbable sutures for muscle and subcutaneous layers and non-absorbable sutures for the skin.

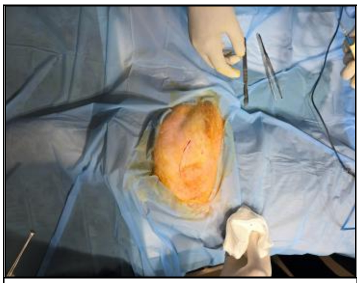
Fig 1: Skin incision over the lateral aspect of the hip joint.


Fig 2: Separation of subcut and muscle layers for joint access.


Fig 3: Exposure of the hip joint during neurectomy.


Fig 4: Transection of articular nerves using curette.

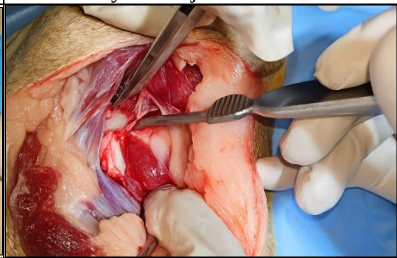
Fig 5: Use of bone chisel for periarticular tissue removal.

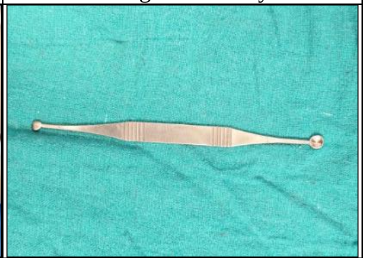
Fig 6: Bone curette used for hip joint denervation.

Post-operative care included antibiotic therapy (amoxicillin-clavulanate 15 mg/kg, B.I.D. for 7 days), analgesics (meloxicam 0.2 mg/kg S.C. for 3 days), and enzyme supplementation. Routine antiseptic dressings were carried out and controlled physiotherapy was initiated to restore limb function. Clinical, haematological, biochemical, radiographic and pain evaluations (UMPS and GCPS) were performed on Days 0, 15, 30, and 60.

Results and Discussion

Clinical Observations

All dogs tolerated the surgical procedure well without any intraoperative or postoperative complications. Progressive improvement in gait, posture, and weight-bearing was evident, with noticeable pain relief observed from Day 15 onwards. Continued improvement through Day 30 and Day 60 indicated effective interruption of nociceptive transmission from the coxofemoral joint. These findings corroborate earlier reports [4, 5], which documented significant improvement in functional performance and reduction in pain following selective hip joint denervation in dogs affected with CHD.

Haematological Parameters

Haemoglobin concentration, total erythrocyte count, total leukocyte count, platelet count, and differential leukocyte count remained within physiological limits throughout the study period. No statistically significant variations were observed among different intervals, indicating haematological stability and absence of systemic stress. Comparable findings have been reported earlier [6, 7], where normal haematological responses were observed following orthopaedic surgical interventions in dogs.

Table 1: Mean±SE of haematological parameters at different time intervals

Parameter	Day 0	Day 15	Day 30	Day 60
Haemoglobin (g/dL)	12.52±0.77	12.28±0.64	12.57±0.49	12.60±0.72
Total Erythrocyte Count (×10/µL)	5.79±0.44	5.79±0.49	5.96±0.41	6.93±0.26
Total Leukocyte Count (×10^3/µL)	12.41±0.47	12.83±0.49	13.02±0.49	13.28±0.51
Neutrophils (%)	63.6±0.90	64.9±0.98	65.2±0.94	64.7±0.94
Lymphocytes (%)	29.0±0.78	27.8±0.86	27.5±0.82	28.0±0.90
Monocytes (%)	3.7±0.25	3.9±0.25	4.1±0.20	4.0±0.20
Eosinophils (%)	4.9±0.25	5.0±0.25	4.7±0.25	4.8±0.25
Basophils (%)	0.5±0.04	0.6±0.04	0.6±0.04	0.7±0.04
Platelet Count (×10^3/µL)	355.00±49.59	388.67±26.39	405.33±24.98	360.83±6.30

Biochemical Parameters

Serum SGOT, SGPT, ALP, BUN, creatinine, and calcium concentrations remained within normal physiological limits throughout the observation period, indicating absence of hepatic or renal impairment. A mild transient rise in hepatic enzyme activity recorded on Day 30 returned to baseline values by Day 60, reflecting adaptive metabolic adjustment rather than surgical stress. These findings are consistent with earlier reports [8, 9], which demonstrated biochemical stability following orthopaedic surgical procedures in dogs.

Table 2: Mean ± SE of biochemical parameters at different time intervals

Parameter	Day 0	Day 15	Day 30	Day 60
SGOT (AST, IU/L)	37.6±1.6	52.5±2.0	37.6±0.6	35.0±2.7
SGPT (ALT, IU/L)	42.1±1.6	55.8±2.2	40.7±1.1	38.2±1.4
ALP (IU/L)	89.1±2.9	112.5±3.8	95.4±3.1	91.6±2.9
BUN (mg/dL)	22.8±1.2	27.5±1.4	23.1±1.0	21.8±0.9
Creatinine (mg/dL)	0.96±0.07	1.18±0.07	1.02±0.06	0.94±0.05
Calcium (mg/dL)	9.30±0.19	9.68±0.20	9.42±0.18	9.35±0.17

Radiographic Evaluation

Sequential ventro-dorsal pelvic radiographs obtained on Days 0, 30, and 60 revealed maintained joint congruity without signs of degenerative progression. Mild improvement in femoral head-acetabular alignment and reduction in periarticular opacity were observed in several cases by Day 60, likely attributable to pain reduction and improved limb mobility. These radiographic findings are in agreement with earlier studies [10, 11], which documented similar patterns of stabilization and early joint recovery following denervation and chondroprotective interventions in dogs.

Table 3: Mean ± SE of radiographic evaluation scores at different time intervals

Parameter	Day 0	Day 30	Day 60
Radiographic Score	1.00±0.00	1.17±0.17	1.33±0.21

Fig 7: Ventro-dorsal radiograph of the hip joint.

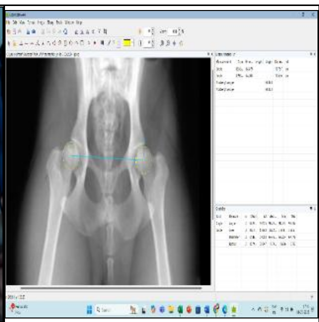

Fig 8: Software-assisted Norberg angle measurement in a dog

Fig 9: Radiograph showing normal hip joint

Fig 10: Radiograph showing bilateral hip osteoarthritis

Pain Assessment (UMPS and GCPS)

Pain scores evaluated using the University of Melbourne Pain Scale (UMPS) and the Glasgow Composite Pain Scale (GCPS) demonstrated a consistent and progressive decline throughout the observation period. A significant reduction in pain intensity was evident by Day 15 and was sustained through Day 60, indicating effective and lasting analgesia following coxofemoral neurectomy. The UMPS effectively reflected gradual behavioural recovery, while the GCPS proved sensitive to short-term nociceptive variations. These findings concur with earlier studies [12, 13], which validated the reliability of these scales for comprehensive assessment of chronic and postoperative pain in dogs.

Table 4: Pain assessment (UMPS and GCPS) during coxofemoral neurectomy

Parameter	Day 0	Day 15	Day 30	Day 60
UMPS Pain Score	6.1±0.5	5.0±0.5	3.8±0.4	3.0±0.3
GCPS Pain Score	6.0±0.5	5.9±0.4	5.7±0.4	5.5±0.3

Conclusion

Coxofemoral neurectomy is a simple, safe and effective surgical option for pain management in moderate CHD cases. It provides sustained relief and functional improvement without adverse systemic effects. Larger studies with long-term follow-up are recommended to evaluate biomechanical outcomes.

Conflict of Interest

Not available

Financial Support

Not available

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