



# EVALUATION AND MANAGEMENT OF SEPTIC ARTHRITIS IN CALVES: A REVIEW OF SIX CASES

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## Abstract

*The study was conducted in six calves presented with septic arthritis belonging to different age, breed and sex. Among the six calves, three were affected with chronic stage of disease with joint contracture and non-weight bearing on the affected limb. Clinical signs of arthritis were noticed in all the cases. Radiography and goniometry provided information regarding response to treatment protocol adapted. Haematology and serum biochemistry were found to have limited diagnostic value. Treatment protocol formulated which contains, three stage lavaging, application of splint and empirical antibiotic therapy showed satisfactory results. The progression of the evaluation of joint disorder, efficacy of the diagnostic modalities and standardisation of treatment protocol was attempted in this study.*

**Key words:** Joint, Calves, Septic arthritis, Lavage, Splint.

Neonatal period is the most crucial period in calves' life and are susceptible to infections and development of malformations. Infectious and congenital affections of joints

cause permanent joint deformities that result in higher culling rate and subsequent production loss in dairy cattle farming (Windeyer *et al.*, 2014). Arthritis is more commonly seen in young calves and among which infectious arthritis predominates (Rohde *et al.*, 2000). Septic arthritis in calves mainly occurs due to haematogenous spread of bacteria from umbilicus (Prasanna, 2003). The clinical signs in arthritis vary depending on the type, cause, severity of the condition and joint affected. Septic arthritis manifests more commonly in carpal joint, hock joint and stifle joint in calves (Jackson, 1999). Physical examination and clinical signs help in early diagnosis of the condition. Radiographic changes, synovial fluid and joint angle of the affected joints provide early information to assess the severity and prognosis of condition and help to assess the efficacy of treatment. Even though there are various treatment protocols adopted based on the joint affection, there is a need by the veterinarian for formulation of a field based protocol in management of joint affections in calves.

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## Materials and Methods

The study was conducted on six calves affected with arthritis presented to the University Veterinary Hospital, Mannuthy over a period of one year. The calves with joint swelling, painful joint and lameness were selected for the study. Signalment and anamnesis were recorded. After Complete physical and clinical examination, orthopaedic examination including radiography and goniometry of the affected joint along with haematology and serum biochemistry were carried out. Treatment protocol was devised based on severity and type of condition. Antibiotics were selected based on the culture and sensitivity test of the samples isolated from the joint.

Antibiotic therapy was initiated in all the cases with a combination of Strepto-penicillin at 20000 IU/kg body weight intramuscularly and Gentamicin at 4 mg/kg body weight intravenously (Ramanathan, 2007). Antibiotics were continued for seven days since no specific isolates could be detected in culture and sensitivity test. Three stage periarticular wound lavaging with potassium permanganate (1:1000) solution followed by acriflavine (1:500) solution and povidone iodine was carried out daily depending up on the severity of the condition. Periarticular abscesses were drained and counter opening was provided. In severe cases with periarticular abscesses and fibrin accumulation, three stage lavage with potassium permanganate solution, acriflavine solution and povidone iodine solution was done intra-articularly. Cavity was plugged with tincture iodine seton and bandaged. The procedure was repeated daily for seven days and on alternate days thereafter. The wounds were routinely dressed with povidone iodine and metronidazole ointment.

Moulded PVC splint conformed to the limb with bending lesser than joint and adequate cotton padding was used for splint bandage. Splint was applied on the palmar aspect and bandaged with limb in forceful extension. A window was provided on the anterior aspect of joint for daily dressing. Physiotherapy with passive flexion and extension along with transcutaneous electrical

nerve stimulator was applied on the days of bandage removal. Analgesic Phenylbutazone at 4 mg/kg intramuscularly was given for five days. Observations were taken on the day of presentation and day 15, 30 and 45 post-treatment.

## Results and discussion

Out of six calves, four were females and two were males. Crossbred calves were observed more commonly affected with septic arthritis followed by Jersey cross. Ramanathan (2007) reported more incidence of septic arthritis in cross bred female calves. The calves were in the age group of one month to three months. Rohde *et al.* (2000) also reported that infectious arthritis was seen most commonly in young calves than adults. In all the calves, bilateral affection of carpal joint was found with varying severity. The more surface area of synovial membrane and highest mechanical activity of these joints could be the reason for susceptibility of these joints to infection (Rohde *et al.*, 2000). All the calves were treated earlier and there was delay in presentation. Three calves were moderately affected and were presented within 10 days of onset whereas the other three calves were chronically affected and were presented after one month of onset of clinical signs.

All the physiological parameters were within the normal range except for pyrexia in all the cases on the day of presentation which became normal after treatment by day 15. Elevated body temperature was seen as a clinical sign in septic arthritis indicating the systemic involvement (Desrochers and Francoz, 2014). Five calves were found affected with concurrent haemoparasitic diseases and were successfully treated with specific antimicrobials but there was reduction in body condition noticed.

Orthopaedic examination revealed hot, swollen and painful discharging joint in all the calves. Lameness was noticed in all the cases. The three chronically ill calves were having non-weight bearing on the affected limb and joint contracture or flexural abnormality. Moulvi *et al.* (2001) explained that flexural

deformities could be seen in chronic cases of arthritis during which the animal avoid placing the limb. Lameness responded to analgesics and reduction in lameness was observed by day 15 in three cases whereas slight lameness with weight bearing with the splint in place was noticed in other three calves with chronic affection. Out of these three chronic cases, only one case recovered by day 45 and other two remained lame even after day 45.

Purulent discharge from the joint was noticed in three cases and fibrinopurulent discharge in three cases. Joint cavity was open through a wound or sinus tract on anterior aspect of the joint in chronic cases with accumulation of pus and fibrinous material in around the joint cavity. The discharge was thick and caseous with fibrin clots, foul smelling and greenish yellow tinged appearance. Reduction in discharge was noticed by day 7 followed by complete cessation of discharge by day 15 except in chronic cases in which discharge got reduced by day 30. Periarticular abscess was noticed in three chronic cases.

#### Haematology and Serum biochemical

evaluation revealed granulocytic leucocytosis, low serum calcium level and elevated alkaline phosphatase levels. Anaemia persisted throughout the study period in all the calves. Mean values of haematological and serum biochemical parameters are represented in Table 1 and Table 2.

Joint range of motion was affected in all the cases; in three cases of less severity, only flexion angle increase was noticed whereas in other three severe cases, extension and flexion angle as well as range of motion was also affected. With treatment, the flexion angle got reduced but not achieved the normal established level whereas extension values were increased to normal by day 45. There was improvement in angulation. The normal flexion, extension angle and range of motion for carpal joint were  $31 \pm SE^{\circ}$ ,  $172 \pm SE^{\circ}$  and  $147-156^{\circ}$  respectively (Sirin *et al.*, 2014). The mean values of joint angle and range of motion are represented in Table 3.

Radiographic changes were confined to periarticular soft tissue swelling and increase in joint space in cases of early presentation

**Table 1** – Mean values of haematological parameters in septic arthritis (Mean $\pm$ SE)

Parameter	Day 0	Day 15	Day 30	Day 45
RBC( $10^6/\mu\text{L}$ )	5.39 $\pm$ 0.59	5.39 $\pm$ 0.64	5.73 $\pm$ 0.45	5.44 $\pm$ 0.57
TLC( $10^3/\mu\text{L}$ )	25.35 $\pm$ 5.61	21.65 $\pm$ 6.30	18.15 $\pm$ 7.02	12.78 $\pm$ 1.98
VPRC (g%)	18.41 $\pm$ 2.28	18.7 $\pm$ 2.41	18.58 $\pm$ 1.34	17.3 $\pm$ 1.34
HB (g/dL)	7.11 $\pm$ 0.70	7.1 $\pm$ 0.79	6.58 $\pm$ 0.45	6.23 $\pm$ 0.60
PLT ( $10^3/\mu\text{L}$ )	419.5 $\pm$ 35.70	437.83 $\pm$ 59.86	445.33 $\pm$ 74.92	401 $\pm$ 55.06
LYM (%)	54.06 $\pm$ 10.46	56.8 $\pm$ 9.27	67.31 $\pm$ 5.72	62.95 $\pm$ 3.53
MON (%)	2.28 $\pm$ 0.80	3.16 $\pm$ 0.89	3.01 $\pm$ 1.00	3.03 $\pm$ 0.80
GRAN (%)	43.65 $\pm$ 9.71	40.03 $\pm$ 8.47	29.66 $\pm$ 5.08	34.01 $\pm$ 3.05

**Table 2** – Mean serum biochemical parameters (Mean $\pm$ SE)

Parameter	Day 0	Day 15	Day 30	Day 45
Ca (mg/dL)	8.97 $\pm$ 1.20	9.03 $\pm$ 0.83	9.98 $\pm$ 1.05	7.70 $\pm$ 0.32
P (mg/dL)	5.93 $\pm$ 0.76	6.03 $\pm$ 0.81	6.21 $\pm$ 0.96	6.82 $\pm$ 0.23
ALP (U/L)	158.48 $\pm$ 32.45	136.51 $\pm$ 18.73	119.63 $\pm$ 24.19	162.02 $\pm$ 39.67
CPK (U/L)	99.23 $\pm$ 25.65	113.01 $\pm$ 18.16	95.94 $\pm$ 23.86	91.12 $\pm$ 20.96

**Table 3** – Mean values of joint angles and range of motion (ROM) (Mean $\pm$ SE)

Angle ( $^{\circ}$ )	Day 0	Day 15	Day 30	Day 45
Flexion	56.00 $\pm$ 12.69	67.16 $\pm$ 19.22	66.33 $\pm$ 18.85	42.66 $\pm$ 12.80
Extension	153.33 $\pm$ 8.23	164.33 $\pm$ 4.96	166.83 $\pm$ 3.47	169.66 $\pm$ 2.55
ROM	97.33 $\pm$ 18.92	97.16 $\pm$ 20.39	100.5 $\pm$ 20.59	127.0 $\pm$ 13.72

whereas extensive periarticular changes along with osteolytic changes, cartilage lesions with gas shadow in joint cavity and loss of normal joint architecture were noticed in severe cases. Ganesh (2009) and Ramanathan (2007) reported osteolytic bony lesions and cartilage loss in joint radiographs could be seen in chronic cases. Radiographic lesions resolved in mild to moderate cases but no improvement could be noticed in chronic cases during the observation period.

Joint fluid did not show any specific bacterial growth and antibiotic was selected empirically. Hopker *et al.* (2014) opined that poor recovery rate of organisms in arthritis cases could be due to previous treatment by referring veterinarian. Physiotherapy with passive exercise and transcutaneous electrical nerve stimulation improved the recovery by alleviating pain and muscle relaxation. Electrical stimulation of tissues for enhanced tissue healing and reduction of pain by interfering with nociceptive nerve conduction was explained by Baxter and McDonough (2007).

In conclusion, the septic arthritis cases can be better managed if they are presented in the early stages of onset of clinical signs. Haematology and serum biochemistry has limited diagnostic value. Goniometry helps to assess the outcome of the treatment. Radiographic findings will be inconclusive in early stages of disease. Chronicity affects the prognosis and increases the complications like joint contracture. Splint application and three stage lavage in such cases may prove beneficial in restoring normal weight bearing and ambulation. Once the cartilage or bony lesions develops, the prognosis will be poor. The three stage joint lavaging provided excellent results in all cases along with the splint application which prevented further joint contraction during healing phase of septic arthritis. This can be very well adopted as a field based protocol in managing septic arthritis.

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