

RADIOGRAPHIC EVALUATION OF EFFECT OF NEGATIVE PRESSURE WOUND THERAPY (NPWT) ON JOINT ILL IN CALVES

**Mandar Y.G.*, B.N. Nagaraja, M.S. Vasanth, L. Ranganath, V. Chandrashekhar
Murthy and V. Mahesh**

Dept. of Veterinary Surgery and Radiology, Veterinary College,
Hebbal, Bengaluru, Karnataka, INDIA – 560024

E-mail: drmandargavkar@gmail.com (*Corresponding author)

Abstract: Joint ill is one of common diseases that affect young calves that were born in unhygienic environment. A total of 15 cases presented to the Department of Veterinary Surgery and Radiology, Veterinary College, Hebbal, Bangalore for a period of one year were selected. Out of these, six cases were subjected to the NPWT. Evaluation was done based on the clinical signs, gross changes, radiographic changes and haemato-biochemical analysis. Majority of the animals showed distended/ swollen joints with open wounds. Most commonly observed radiographic signs were soft tissue swelling around the joint, increased intra-articular spaces and air spaces/ gas shadows and in chronic cases ankyloses, severe arthritic changes, subchondral osteolysis, etc. The animals were moderate to severely lame on the day of presentation which gradually became mildly lame and in some cases no lameness was reported by the end of the treatment and these clinical changes of healing were correlated radiographically.

Keywords: Calves, Joint ill, Negative Pressure Wound Therapy, Radiographic evaluation.

INTRODUCTION

India is the leading milk producing country in the world. The dairy industry in India is growing rapidly having significant contribution to the national economy. Joint ill is a crippling disease in calves that causes heavy losses to the dairy industry. The term ‘septic arthritis’ is commonly accepted for the condition in which bacteria have entered the synovial space of a joint causing severe inflammation (Lloyd *et al.*, 1990; Schneider *et al.*, 1992a). Joint ill in calves is classified as a tertiary septic arthritis; the primary infection was in the umbilicus, often as an umbilical abscess with extension along the umbilical vein towards the liver (Andrews, 2004).

Radiographic examinations of the joints are common procedures for diagnosis and assessment of joint disease (Nouri *et al.*, 2013). Radiography was proven to be the main imaging technique to give information about the stage and prognosis of the joint problems (Dogan *et al.*, 2016). Various commonly observed radiographic findings were soft tissue swelling of the affected joints, increased width of the intra-articular space and sub-chondral

osteolysis (Jackson, 1999 and Tremaine, 2000). Meijer *et al.* (2000) stated that treatment of septic arthritis remains costly and time consuming due to repeated surgical interventions and prolonged course of antibiotic administration. DeFranzo *et al.* (2001) found that Vacuum Assisted Closure (VAC) therapy greatly reduced the amount of tissue oedema, diminished the circumference of extremity and decreased the surface area of wound in 75 human patients having lower extremity wounds with exposed bone. Joint ill is very common disease that frequently affects the calves. Due to the prolonged treatment period, expensive costs and lack of effective treatment, a considerable number of animals are being lost every year, in an attempt to overcome these complications/ limitations the present study was carried out.

HISTORY AND OBSERVATIONS

The calves were presented with the history of non-weight bearing lameness or partial weight bearing on the affected limb, anorexia and swollen joint. The animals in which multiple joints were involved were presented in recumbency. The joints were severely distended and the animal evinced severe pain during extension and flexion. Pus discharge was found oozing out from the joints which were already open and necrosis of the surrounding tissue was observed in two cases. The animals resisted walking and could not support and stand for a longer period of time.

MATERIALS AND METHODS

The study was carried out on six clinical cases of calves suffering from joint ill, presented to Veterinary Surgery and Radiology, Veterinary College, Hebbal, Bangalore. All the animals were subjected to (NPWT) machine and the healing process was evaluated radiographically. Radiography was carried out with Allengers HF Mars-6 portable X-ray machine having the capacity of KVp: 40-110 V; mAs: 0.3-140

RESULTS AND DISCUSSION

Majority of the radiographs of the affected joints showed soft tissue swelling around the joint, intra-articular spaces and air spaces/ gas shadows. In chronic cases, ankyloses of the joints were recorded. Radiographs of acute cases of joint ill did not reveal any osteological changes, but were evident only in chronic cases. In total 28 joints were subjected to radiographic examination of which, soft tissue swelling was observed in 21 (75%) joints, increased intra-articular spaces in 10 (35.71%), air pockets/ spaces in 7 (25%), subchondral osteolysis in 5 (17.85%), severe arthritic changes in 3 (10.71%) and ankyloses in 2 (7.14%) joints (Table 1).

Table 1: Radiographic findings in various joints affected with joint ill.

SI. No.	Radiographic findings	Number of joints					Total
		Carpus	Tarsus	Stifle	Elbow	Fetlock	
1.	Soft tissue swelling	15	4	-	1	1	21
2.	Increased intra-articular spaces	7	2	-	-	1	10
3.	Air spaces	5	2	-	-	-	7
4.	Subchondral osteolysis	4	-	1	-	-	5
5.	Severe arthritic changes	3	-	-	-	-	3
6.	Ankyloses	2	-	-	-	-	2

In the present study the most commonly observed radiographic findings were soft tissue swelling, air spaces, increased intra-articular spaces, osteolysis, severe arthritic changes, subchondral osteolysis and ankyloses of joint in two cases. The soft tissue swelling showed evident reduction from the day of presentation to the 28th day post treatment (Fig. 3). Similar findings were also observed by Bennett and Taylor (1988), Kofler (1996), Jackson (1999), Desrochers (2004), Lugo and Gaughan (2006) and Ramanathan (2007). Jackson (1999) and Dogan *et al.* (2016) reported that in early stages of joint ill, only soft tissue swelling around the joint was evident in the radiographs; destruction of cartilage, lysis of bone was observed in more advanced stages.

In the present study, significant arthritic changes were observed in affected calves including severe articular destruction, ankyloses, bone lysis, this may be attributed to delayed presentation of the cases for treatment (only after 2-4 weeks from the onset of infection). Similarly, Kofler (1996) studied the radiographs of 25 cattle with traumatic and septic arthritis and observed soft tissue swelling of the affected joint region in all cases.

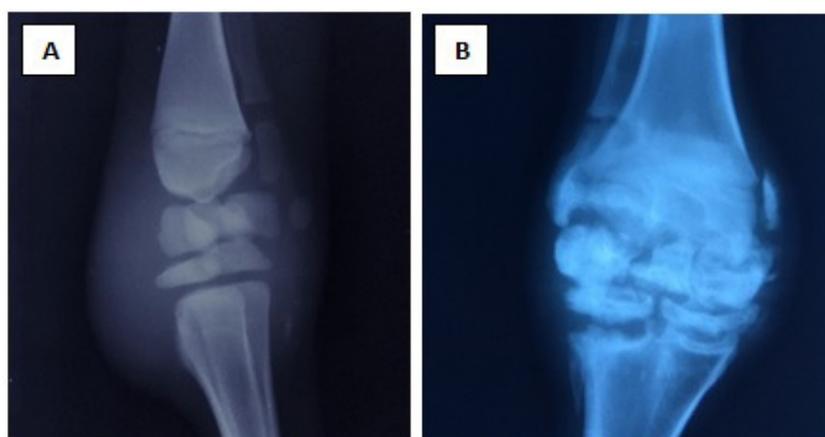


Fig. 1: A. Radiograph of ML view of right carpal joint showing soft tissue swelling and increased intra-articular spaces. B. Radiograph of AP view of left carpal joint showing severe arthritic changes and no clear demarcation between the carpals.

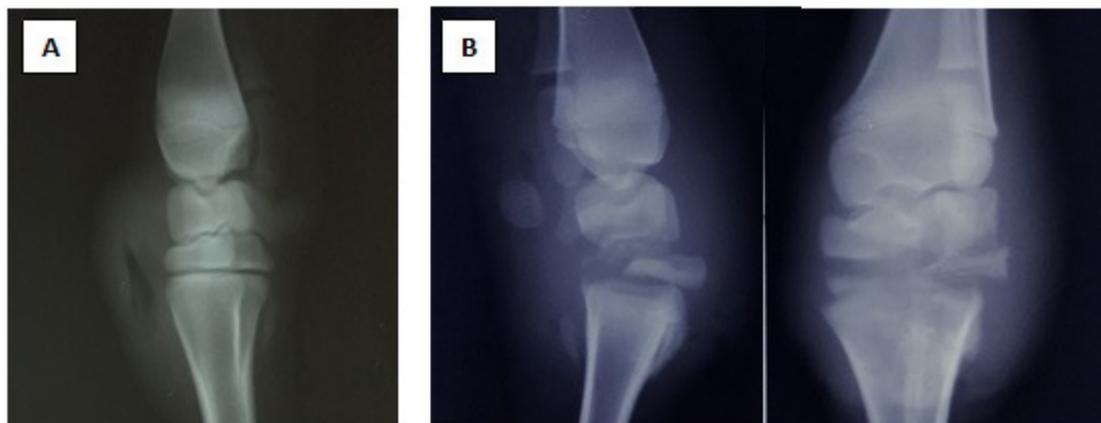
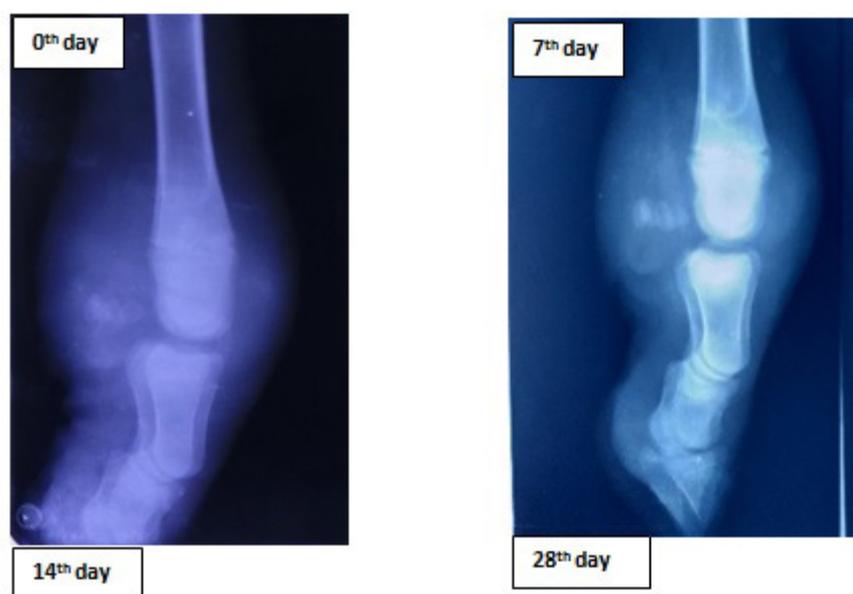


Fig. 2: A. Radiograph of ML view of right carpal joint showing, soft tissues swelling and air spaces. B. Radiograph of AP and ML view of left carpal joint revealed arthritic changes and anterior displacement of the 4th carpal bone

CONCLUSION

NPWT machine for treatment of joint ill showed significant improvement when compared to the conventional treatment with only antibiotics and joint lavage. Radiographic examination of the affected joints also supported the fact that there was a considerable improvement in the clinical cases from the day of presentation to the end of the treatment. It can be concluded that NPWT is effective and can be used in combination with conventional treatment method for better results.



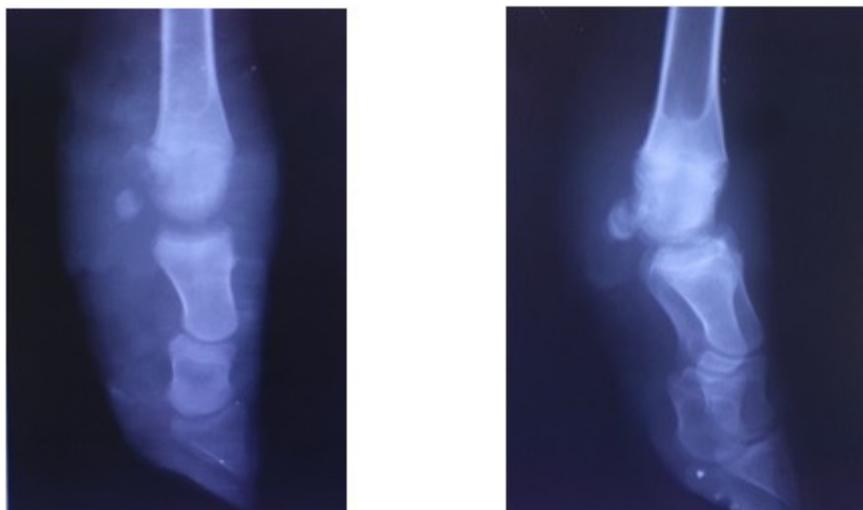


Fig 3: Radiographs of ML view of left fetlock joint showing gradual reduction in the soft tissue swelling from 0th day to 28th day

REFERENCES

- [1] Andrews, A.H. (2004) Bovine medicine, diseases and husbandry of cattle. Ed: Andrews, A.H., Blowey RW, Boyd H and Eddy RG 10th ed., Blackwell publishing company, Oxford university press, pp: 249-250.
- [2] Angus, K. (1991) Arthritis in lamb and sheep. In practice, 204-207.
- [3] Bennet, D. and Taylor, D.J. (1988) Bacterial infective arthritis in the dog. J. Small. Anim. Pract., 29: 207-230.
- [4] Defranzo, A.J., Argenta, L.C. and Marks, M.W. (2001) The use of vaccum assisted closure therapy for the treatment of lower extremity wounds with exposed bone. Plast. Reconstr. Surg., 108 (5): 1184-1191.
- [5] Desrochers, A. (2004) Septic arthritis. In: Farm Animal Surgery, Edt. Fubini, S.L., and Ducharme, N.G. Edn. 9th., Elseiver, St Louis, MI., pp 330–336.
- [6] Dogan, E., Yanmaz, L.E., Okumus, Z., Kaya, M., Gokhan, M. and Cengiz, S. (2016) Radiographic, ultrasonographic and thermographic findings in neonatal calves with septic arthritis: 82 cases. Ataturk Univ. Vet. Bil. Derg. 11(1): 6-12.
- [7] Jackson, P. (1999) Treatment of septic arthritis in calves. In Practice, 596-601.
- [8] Kofler, J. (1996) Arthrosonography - the use of diagnostic ultrasound in septic traumatic arthritis in cattle- a retrospective study of 25 patients. British Vet. J., 152: 683-698.
- [9] Lloyd, C.K., Stover, S.M., Pascoe, J.R and Adams, P. (1990) Synovial fluid pH, cytologic characteristics, and gentamicin concentration after intra-articular administration of the drug in an experimental model of infectious arthritis in horses. Am. J. Vet. Res., 51: 1363-1369.

[10] Lugo, J. and Gaughan, E.M. (2006) Septic Arthritis, Tenosynovitis and Infections of Hoof Structures. *Vet. Clin. Eq. Pract.*, 22: 363–388.

[11] Meijer, M.C., Vanweeren, P.R. and Rijkenhuizen, A.B. (2000) Clinical experiences of treating septic arthritis in the equine by repeated joint lavage: a series of 39 cases. *J. Vet. Med. Physio. Pathol. Clin. Med.*, 47: 351–365.

[12] Nouri, M., Marjanmehr, S. H. and Nowrouzian, I. (2013) Deep septic arthritis of the fetlock joint in two dairy cows: Clinical, radiographic and pathomorphologic findings. *J. Anim. Poultry Sci.*, 2(1): 19-26.

[13] Ramanathan, A. (2007) Arthroscopic partial synovectomy and joint lavage in the treatment of septic arthritis in bovine. Ph.D. thesis submitted to Tamil Nadu Veterinary and Animal Science University, Chennai, India.

[14] Schneider, R.K., Bramlage, L.R., Moore, R.M., Mecklenburg, L.M., Kohn, C.W. and Gabel, A.A. (1992a) A retrospective study of 192 horses affected with septic arthritis. *Equine Vet. J.* 24: 436-442.

[15] Tremaine, H. (2000) Infection of equine joints and tendon sheaths. *In Pract.* 262-274.