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# CLINICAL EVALUATION OF TWO SURGICAL TECHNIQUES FOR INTERDIGITAL HYPERPLASIA IN CATTLE

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**Abstract:** The study was conducted on 12 clinical cases of cattle presented to TVCC, PGIVAS, Akola with interdigital hyperplasia. These clinical cases were randomly divided into two equal groups irrespective of their age, sex and breed. Cases in Group A underwent conventional method of excision whereas in Group B electrocautery was used. Comparative evaluation of these two techniques was carried out on the basis of qualitative assessment, Haemato-biochemical, Clinico-physiological and histopathological investigations. Electrocautery technique was proved to be superior than conventional method for excision of interdigital hyperplasia in cattle.

**Keywords:** Interdigital hyperplasia, Electrocautery, Excision.

## INTRODUCTION

Livestock plays an important role in the rural economy in our country. Farmers in India maintain mixed farming systems i.e. combination of crop and livestock where the output of one enterprise becomes the input of another enterprise thereby maintaining a constant source of income for their livelihood. Lameness in cattle is a serious welfare issue and causes significant economic losses to livestock owners (Collick *et al.,* 1989; Potter and Broom, 1990). It has been ranked the third most common disorder besides mastitis and infertility problem (1983; Enting *et al.,* 1997). However, progress in understanding the causes of lameness has been slow and is still incomplete. The incidence of lameness ranges upto 65% (Ward, 1994; Murray *et al.,* 1996).

There are numerous conditions which cause lameness in cattle such as laminitis, claw disease, foot rot, and interdigital hyperplasia. Interdigital hyperplasia is also known as interdigital fibroma, corn, or tyloma. It is a firm, fibrous mass that protrudes from the interdigital space. It usually begins at the axial surface of the anterior interdigital space on the lateral claw of the rear limb and can progress to lesions spanning the entire interdigital space. The fibroma can extend from the dorsal to the palmar/plantar end of the cleft, while filling

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the entire gap between the claws Sharda *et al.,* (2017). It occurs sporadically in all breeds of dairy cattle and genetic predisposition has been suspected in some breeds AABP (2014).

**MATERIALS AND METHODS**

Present study was undertaken at Teaching Veterinary Clinical Complex, Post Graduate Institute of Veterinary and Animal Sciences, Akola. Twelve clinical cases of cattle with Interdigital hyperplasia (Fig.1) were included in this study. These cases were randomly divided into two equal groups irrespective of their Age, Sex, Breed and nature of growth. Cases in group A underwent conventional method of excision whereas in group B electrocautery was used.

i. Restraint and Anaesthesia:

Considering the temperament of the animal, the cases were sedated with intravenous injection of Xylazine @ 0.01mg/kg BW as and when required. Animal was restrained in lateral recumbency with affected limb on the upper side and other limbs were all secured together with rope. To achieve optimal anesthesia a tourniquet was applied above fetlock joint and intravenous retrograde analgesia was performed by using injection 2% Lignocaine hydrochloride through radial vein in forelimb and through tarsal vein in hind limb.

ii. Conventional method of excision

After proper restraining of the animal, the site was prepared aseptically. The two digits were drawn apart with the help of two bandages for better exposure and working space. The mass was held with Allis forceps. A skillful wedge-shaped incision (Fig. 2) was placed around the mass using BP blade no. 22 in such way that there was minimal bleeding. Bleeding points were ligated with catgut no. 1. All hyperplastic tissues were removed completely. The interdigital fat, if any, was removed completely to avoid its interposition between the skin edges leading to delayed healing. Skin edges were opposed using nylon by placing simple interrupted sutures. After removal of the mass, two holes were drilled at the tip of each claw. A stainless-steel wire was passed through them and they were tied together to keep the digits closer to each other to facilitate healing. The surgical wound was bandaged to avoid contamination of the site.

iii. Excision using electrocautery

A 230 Volt 6 Ampere Smart-ACC microprocessor based Electrocautery System (ECS) with a cautery pencil (hand piece of active electrode) was used in the present study. The flow of current was controlled by hand held switch on the electrode (cautery pencil). The claw was held apart with the help of cotton bandages. The mass was held with Allies forceps.

An incision was made from a central point approximately 2 inches dorsal to interdigital space and extended laterally and ventrally on each side of the mass until the incision lines met and the mass was excised. (Fig.3) Electrocoagulation was undertaken to seal the bleeding points. The interdigital fat was removed. After excision, based on the size of the mass, skin was opposed with simple interrupted sutures using nylon as in conventional excision. In cases where the mass was large and apposition wasn't possible, it was left to heal by second intention. In all the cases, toes were drilled and tied for immobilisation to aid the healing process.

Postoperatively, Inj. Meloxicam (0.5 mg/kg BW), Inj. Strepto-penicillin (10 mg/kg BW) and Inj. Chlorpheniarmine maleate (0.5 mg/kg BW) were administered intramuscularly for 5 consecutive days in both the groups. Bandaging was performed on alternate days as deemed necessary and sutures were removed after complete healing of surgical wound.

Qualitative assessments of technique was done on the basis of surgical convenience, Ease of procedure, Post-operative complications, Time required for healing and Lameness score which was evaluated as per Sprecher et al., 1997 on 0,7$^{th}$,14$^{th}$,21$^{st}$ and 28$^{th}$ day. Haemato-biochemical parameters like Hb, TEC, TLC, Total serum protein and Alkaline phosphotase and Clinico-physiological parameters were studied on 0,3$^{rd}$ and 14$^{th}$ post operative day. Histopathological examination of excised tissue samples was undertaken by routine H&E method.

**RESULT AND DISCUSSION**

1. Qualitative Assessment of Technique

i. Surgical convenience:

Convenience to the surgeon while performing the surgical intervention was assessed with respect to proper exposure of site and working space. Electrosurgery proved to be superior. An electrocautery pencil was used with ease in large masses wherein there isn't enough exposure of the surgical site. Also, chances of damage to the adjacent tissues were reduced as compared to when a scalpel with blade was used.

ii. Ease of procedure

This was evaluated by amount of bleeding and time required for the completion of surgery. Intra-operative bleeding was comparatively difficult to control in conventional excision. Minimal blood loss was observed in cases that underwent excision using electrocautery wherein bleeding points were sealed effectively thus reducing time required for surgery. Also, precise cutting was achieved when electrocautery was used. Ease of skin

apposition was dependant on the size and chronicity of the condition and not solely on the method used for excision.

iii. Post-operative Complication

Post-operative bleeding and exudation was comparatively lesser following excision with electrocautery, which also reflected on time required for healing. Recurrence was not observed for a period of 3 months in any case where electrosurgery was performed, whereas, in one case that underwent surgery by conventional method showed recurrence after one month.

iv. Time Required for Healing

The data recorded for healing time was analysed by t-test. In conventional excision the average time required for the wound healing was 45.66 ± 1.14 days whereas, the animals of Group B required 32.50 ± 1.25 days for complete healing. Total time required for wound healing in Group B was lesser than that Group A.

**Table 1:** Time required for wound healing (in days) of both groups

| Number of Cases | Group A | Group B |
|---|---|---|
| 1 | 45 | 32 |
| 2 | 43 | 34 |
| 3 | 48 | 36 |
| 4 | 42 | 30 |
| 5 | 47 | 35 |
| 6 | 49 | 28 |
| Average (Days) | 45.66 | 32.50 |
| Mean ± SE | 45.66 ± 1.14 | 32.50 ± 1.25 |

Healing was faster in cases that underwent electrosurgery due to lesser exposure of internal tissues (reduced operative time) and minimal bleeding. Toe-wiring expedited healing by maintaining proper distance between the claws, thus avoiding splaying of the foot and wound dehiscence. Also, postoperative bandaging prevented contamination of the wound and aided faster healing. Similar findings were observed by Sivabalan (1979) and Gosai (2013).

v. Lameness Score

Lameness scores reduced as the study progressed in both groups. However, in group A lameness was not observed on 28$^{th}$ day, whereas Group B animals did not show lameness 21$^{st}$

day onwards. The differences in interval mean values of both the groups were statistically significant at 5% level of significance.

**Table 2:** Mean ± SE of Lameness Score of both groups at different intervals

| Interval | Group A | Group B | Pooled Mean |
|---|---|---|---|
| $0^{th}$ Day | 1.33 ± 0.21 | 1.50 ± 0.22 | $1.46^{d}$ ± 0.33 |
| $7^{th}$ Day | 1.00 ± 0.26 | 1.00 ± 0.00 | $1.00^{c}$ ± 0.31 |
| $14^{th}$ Day | 0.50 ± 0.22 | 0.50 ± 0.22 | $0.50^{b}$ ± 0.22 |
| $21^{st}$ Day | 0.16 ± 0.17 | 0.00 ± 0.00 | $0.08^{a}$ ± 0.22 |
| $28^{th}$ Day | 0.00 ± 0.00 | 0.00 ± 0.00 | 0.00 ± 0.00 |
| Pooled Mean | 0.60 ± 0.10 | 0.60 ± 0.90 | |

Means bearing same superscript differ non-significantly

This could have been due to involvement of the soft tissue. This was in accordance with the Sivabalan (1979), Gosai (2013) and Raulkar (2017).

2. Clinico-Physiological Parameters

Clinico-physiological parameters like rectal temperature, heart rate and respiration rate remained within the normal physiological limit during the study period and did not show statistical difference.

**Table 3:** Clinico-physiological values at different intervals in both the groups.

| Groups | Intervals (days) | Rectal Temperature (˚F) | Heart Rate (beats/min) | Respiration Rate(breaths/min) |
|---|---|---|---|---|
| Group A | 0 | 102.10 ± 0.23 | 42.65 ± 0.71 | 26.00 ± 0.73 |
| | 3 | 101.95 ± 0.13 | 43.00 ± 0.68 | 25.50 ± 0.43 |
| | 14 | 101.86 ± 0.08 | 43.65 ± 0.61 | 25.50 ± 0.72 |
| Group B | 0 | 101.75 ± 0.21 | 42.00 ± 0.82 | 26.00 ± 0.86 |
| | 15 | 102.08 ± 0.19 | 41.83 ± 0.21 | 26.00 ± 0.89 |
| | 30 | 101.83 ± 0.21 | 42.50 ± 1.08 | 27.00 ± 0.73 |

**3. Biochemical Parameters**

i. Alkaline Phophotase

Significant increase was noted in group B ($p<0.05$), suggestive of wound healing with cessation of cell proliferation, progression of granulation tissue, formation and remodelling.

This has been used as a marker for wound healing. Similar findings were also observed by Hussain *et al.* (2004) and Al-Derawie (2012).

ii. Total Serum Protein

There was a gradual increase in the value of total serum protein in both groups as the study progressed. This may have been due to dehydration resulting in polycythemia. However, these changes were statistically and clinically non-significant as the values were within the normal physiological limit.

**Table 4:** values at different intervals in both the groups

4.

| Groups | Intervals (days) | Alkaline Phosphatase | Total Serum Protein |
|---|---|---|---|
| Group A | 0 | 89.65 ± 5.06 | 7.00 ± 0.56 |
| | 3 | 92.50 ± 5.03 | 7.24 ± 0.56 |
| | 14 | 95.00 ± 4.93 | 7.51 ± 0.49 |
| Group B | 0 | 100.97 ± 7.20 | 7.20 ± 0.35 |
| | 15 | 110.60 ± 7.71 | 7.55 ± 0.36 |
| | 30 | 116.60 ± 7.31 | 8.08 ± 0.38 |

**Histopathological Examination**

Tissue from excised mass was collected in 10% neutral buffered formalin and sent for histopathological examination. On processing the sample and staining with haematoxylin and eosin (H&E), examination of tissue/mass revealed that, the surface epidermis was acanthotic with superficial erosions. The stratum corneum was diffusely thickened with parakeratosis layer and degenerative neutrophils admixed with amphophilic amorphous material was observed. Multifocal epidermal papillations were covered by parakeratotic caps expanded by intracorneal lakes of degenerative neutrophils. Thus the histological examination confirmed the case as interdigital hyperplasia (Fig. 4).

These results are in accordance with those of Uma and Katherisan (2008) Balappanavar and Patil (2012), Gosai (2013) and Sharda *et al.* (2017).

**5. Haematological Parameters**

Statistically non-significant variations were observed for Hb, TEC, and TLC.

**Conclusion**

Electrosurgery was proved to be superior than conventional excision for surgical management of interdigital hyperplasia in cattle, owing to precision cutting, effective

hemostasis, reduced time required for surgery and chances of damage to adjacent structures, faster healing, lesser post-operative complications and less chances of recurrence as well.

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**Fig. 1. Bullock with bilateral interdigital hyperplasia**

**Fig. 2. Excision of interdigital hyperplastic growth by Conventional method**

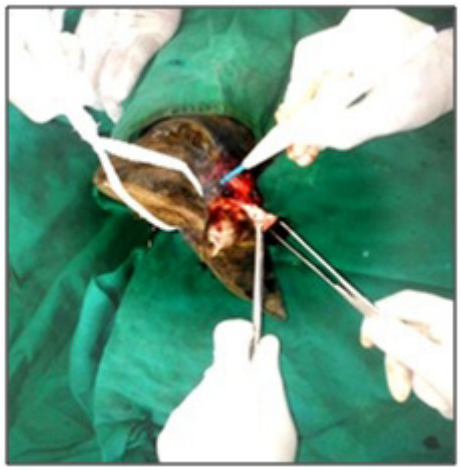

**Fig. 3. Excision of Interdigital Hyperplastic growth using Electrocautery**

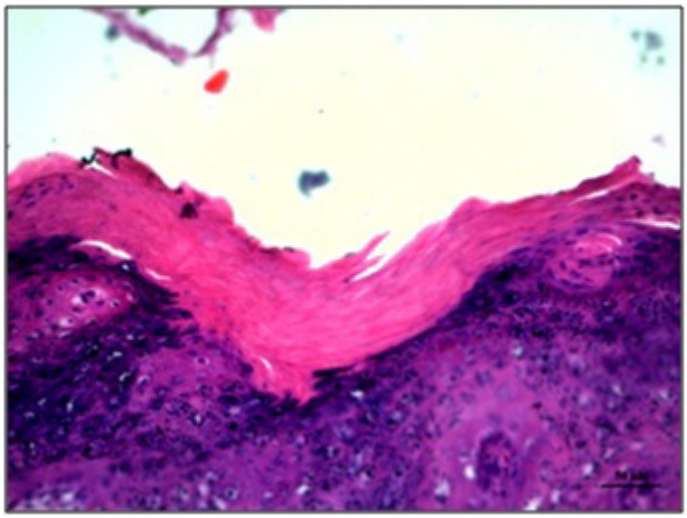

**Fig.4. Diffusely thickened stratum corneum with hyperkeratosis**