A comprehensive study on surgical affections of horns in buffaloes (*Bubalus bubalis*)

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Abstract

Various surgical affections of horns in buffaloes were studied and the order of their frequency was, fracture (n=433; 42.36%), avulsion (n=378; 36.99%), septic horn (n=77; 7.53%), overgrown horns (n=49; 4.79%), fissures (n=4.69%), maggotted wound (n=22; 2.15%) and empyema of frontal and cornual sinus (n= 12; 1.17%) and cancer (n=3; 0.29%). Trauma was the exciting or predisposing factor for many of these conditions. Amputation of horn by modified flap method was felt satisfactory for various conditions. Conservative method was also affective but was time taking. The prognosis in horn cancer was unfavourable. Conditions like, empyema, septic horn, and maggot wound needed several reviews before complete recovery. Avulsion was highly painful and regional analgesia was recommended even for bandaging the horn. Overgrown horns in neglected cases resulted in significant soft tissue damage.

Key words: Horn; fracture; cancer; empyema of cornual sinus; *Bubalus bubalis*.

Introduction

Horns are weapons that are used by cattle in competitive encounters at the feed bunk, hay bale, shade tree, water trough, over breeding privileges or dominance and against man in offensive or protective situations (Hamdi et al 2013). Anatomically, horn is an extension of cornual process of frontal bone. Horns are important defence organs for the ruminants. After introduction of organized farming practices, livestock farmers have been habituated to carry out debudding for the calves so as to enable easy management. However, this is not at all being followed in buffalo species, as these are characterized only based on horns. Similarly, the curly horns with a wider base are known for various graded up Murrah buffaloes. The long horns without any curls characterize a non-descript buffalo. It is a common practice for the farmers to decorate the horns by painting them. In shandies (weekly local market), the valuation of these animals is done based on orientation of horns besides established traits. In this paper, various affections of horns and associated frontal sinus were comprehensively presented.

Materials and methods

A total of 1,022 buffaloes with various affections of horns, presented to the Department of Veterinary Surgery and Radiology, NTR College of Veterinary Science, Gannavaram for a period of ten years were included in this study. The aetiology, clinical signs, diagnosis, conservative and radical surgical procedures adopted and their outcome were presented; the results were analyzed and discussed.

Results and discussion

Buffaloes are known for their ferocious nature and often fight among themselves, especially more so, when they go out in a group for grazing. Because of this, they may damage their horns besides frequently injuring the soft tissues. Trauma, physical insult, infighting and butting among fellow animals were the main aetiological factors for several affections of horns like avulsion, fracture, empyema, septic horn maggot wound etc. Various affections of horns recorded were categorized in table 1.

Table1. Affections of Horns in Buffaloes

S.No	Condition	Number	Percentage
1	Avulsion	378	36.99
2	Empyema of cornual sinus	12	1.17
3	Fissures	48	4.69
4	Fractures	433	42.36
5	Horn cancer	3	0.29
6	Maggot wound	22	2.15
7	Overgrown horns	49	4.79
8	Septic horn	77	7.53

1. Avulsion

By definition, avulsion means actual loss of anatomical tissue. This is the second largest condition affecting horns in buffaloes. A total of 378 out of 1,022 cases (with 48 percent) have been recorded. In case of avulsion, the outer horn covering gets separated from the bony core (Fig 1). This mostly happens due to traumatic reasons like hitting a wall or post or due to infighting or automobile accidents. This is one of the most painful conditions. There is considerable bleeding over the stump of the horn. It was a common observation that, many farmers apply red mud or fasten hairs over the stump of the horn. The animals do not allow anyone to touch or dress the part. An attempt to remove the hairs or mud caused so much pain to the animal and in a few occasions, self-inflicted wounds like abrasions due to falling in a Travis have been recorded.

Analgesia of horn achieved by performing cornual nerve block and ring block was found more useful in treating avulsion of horn in buffaloes. Verma and Kumar (1999) also made similar recommendation. The blood clots were removed after irrigating the stump of the horn with mild potassium permanganate solution (1 in 1,000). A tincture benzoin seal was applied over the horn. Analgesics like Meloxicam were given @ 0.2 mg/Kg IM for three days. Parenteral styptics like adrenochrome monosemicarbazone, or ethamsylate injections were given so as to arrest the capillary bleeding in fresh cases. Antibiotics were never used and there were no episodes of sepsis in any of the animals treated for avulsion. The horny layer could be seen completely after 2 to 3 months.

Verma and Kumar (1999) treated avulsion of horn by with an antiseptic dressing with pine tar and carbolic acid in oil soaked bandage. Umadevi and Umakanthan (2013) used a mixture of lime and palm jaggary to treat avulsion of horn in farm animals. Mahida *et.al.* (2009) reported avulsion of the horn and septic horn and/or maggotted wound of the horn as the more prevalent horn affections in Surti and Mehasana buffaloes.

Fig 1: Avulsion of horn. Note separation of horny shell from the bony core

Fig 2: Fracture of the horn including the frontal bone.

Fig 3: Exophthalmos due to accumulation of pus at the postorbital diverticulum

Fig 4: A deep fissure near the base of the horn.

Fig 5: Stuffing of horn with Zinc oxide powder followed by paraffin sealing.

Fig 6: The modified flap method in progress.

Fig 7: Postoperative appearance

Fig 8: The loose horn with loss of rigid orientation in horn cancer

Fig 9: Exaggerated growth of horn in cancer

Fig 10. Cauliflower like growths in cancerous horn

Fig 11. Wriggling maggots at the tip of the broken horn

Fig 12: The damage caused by the overgrown horn

Fig 13: Pus discharges in septic horn

Fig 14: Treated septic horn in a buffalo

2. Empyema of frontal and cornual sinus

Twelve out of 1,022 cases (1.17 per cent) were diagnosed with empyema of frontal sinus. In all the twelve animals, there was trauma to the horn with (Fig 2) or without frontal bone fracture exposing frontal sinus. Diagnosis of this condition appeared a bit difficult when compared to others. Another important finding was that, all the cases were recorded only during rainy season. This was seen as a sequel to amputation of horn as the frontal sinus directly communicates with the core of the horn in cattle and buffaloes as reported by Gaughan *et. al* (2004) and Silva *et.al.* (2009).

The clinical signs in this condition were unilateral exophthalmos (Fig 3), nasal discharges, history of trauma to horn etc as recorded by Chaudhary *et.al.* (2010). Unilateral discharges of mucoid to mucopurulent nature were also noticed by Quinn *et.al* (2005). The exophthalmia noticed in the present condition could be attributed to the accumulation of pus in the postorbital diverticulum, as explained by Krishnamurthy (1993).

There were signs of systemic illness like dullness, anorexia etc. in a few cases. The percussion over the affected part yielded dull sounds.

Treatment for this condition was challenging as the condition largely demands cooperation of the client. A course of Streptopenicillin @ 100 mg/10m Kg was given from 7 to 14 days depending upon the severity. In cases, where the surgical wounds dehisced, flushing with mild potassium permanganate was carried out daily. Once the discharges ceased, oxytetracycline topical liquid was instilled in to the sinus cavity. Mohanty *et.al* (1972) also used Terramycin liquid for regular irrigation for treating sinusitis. In one refractory case, the healing time as long as 6 months was observed.

3. Fissures

Fissures are cracks along the length of the horn. Among 1,022, a total of 48 cases of fissures (with 4.69 per cent) were recorded. This was also found to result from trauma due to regular paring before applying dyes to the horns. A trauma of lesser threshold than that required to cause fracture was thought to result in fissures. This condition was mostly asymptomatic except for the visual presence (Fig 4) in a few cases. The interest of the farmers to bring their animals to the hospital appears loss of aesthetic sense, as their animals command a lesser price in shandies. However only in a few (n=6), there was bleeding from the fissure as this involved a portion of horn core. Pain was mild to moderate in this condition. Topical styptics like tincture benzoin were applied after removing blood clots. A course of broad spectrum antibiotics and analgesics were given on. This condition responded within 15 to 21 days. The fissures without involving the core were treated by dressing with routine antiseptics. No reports are available on fissures in large ruminants to discuss these findings, perhaps due to the mild nature of the condition.

4. Fracture of horn

Fracture of the horn is the most frequent condition in buffaloes with 433 out of 1,022 cases (42.36%). Fracture can occur at any length of the horn i.e. at its distal, middle or at or lower one third (table 2).

Table 2. Position of horn fracture

Description of lesion	Number	(%)
At lower one third	259	59.82
At middle one third	56	12.93
At distal one third	118	27.25
Total	433	100.00

Among all, fracture of the horn at the lower one third appears to be high with 59.82 per cent (n=259 out of 433), followed by distal one third with 27.25 (n= 118) per cent and middle one third with 12.93 (n=56). The fracture of horn is a very painful condition. If the base of the horn is fractured, there is considerable bleeding exposing the trabeculae. There were nasal discharges from the same side of horn fracture, as the frontal and nasal cavities communicate with each other in these species. In buffaloes, the extension of inflammation to the frontal sinus with development of empyema was a less frequent possibility.

Fractures at the distal end were managed by dehorning just below the seat of fracture followed by antiseptic dressing. Fractures at the middle one third were managed in two ways. In cases, where the base of the horn was stubborn, it was treated on conservative grounds i.e. by antiseptic dressings and analgesics for 5 to 7 days. In cases, where the base of the horn was loose and hanging, amputation by flap method was adopted successfully.

Fractures at the lower one third were treated by conservative and radical methods. The conservative method was followed in debilitated, pregnant and anaemic animals. In this method, after removing the hanging stump, under anaesthesia, the base of the horn was thoroughly flushed with mild potassium permanganate solution and the same was drained off by tilting the head down. After drying the base of horn, zinc oxide powder was stuffed in to the sinus space and was sealed by melted paraffin (Fig 5). This was re-examined after one month and the same was repeated when felt necessary. In a few animals (n=14) leafy extract of *Achyranthus* (*Uttareni* in Telugu) along with camphor was stuffed in to the base of the horn. This was covered by a sterile pledget. This was relatively inexpensive and yielded encouraging results. Hence, this technique can be recommended in situations where the wallet of the farmers does not comply with expensive treatment. Iron bars, rings, nuts and bolts (Patil *et.al*, 2007) bamboo sticks (Balappanavar, 2005) were used as external splints for stabilization of the fractured horn with intact skin. However, Conservation of horns in buffaloes could not be practiced as all the fractures were complete.

The non-pregnant buffaloes were sedated using xylazine hydrochloride @ 0.05 mg/Kg body weight IM; whereas, the pregnant animals were given triflupromazine hydrochloride @ 0.1 mg/Kg body weight IM. They were controlled in a Travis in standing position and, local analgesia was achieved by performing cornual nerve block supplemented with ring block, using 2 percent Lignocaine hydrochloride. As the buffaloes with

massive and curly horns receive innervation from twigs of cervical spinal nerves, apart from cornual nerve, ring block was also felt necessary. Kulbhushan *et.al* (1999) Kumar and Thilagar (2000), Stafford and Mellor (2005) and Mistry (2009) also made similar observations regarding analgesia for horn in buffaloes.

In radical method, amputation by flap method was adopted. Standing position was satisfactory for performing amputation of horn. Amputation of horn in buffaloes differs technically from that of cattle owing to their curly and massive nature (Tank *et.al*, 2006 and Shivaprakash *et.al*, 2007). The traditional method of flap method could not be followed in buffaloes as the circular incision around the base of the horn was not possible as the posterior part of the horn was largely masked by the wider and curvy horn. The incision on the anterior half was made initially that was extended towards nuchal's crest and also towards lateral canthus of eye and the cranial half of the flap could be raised and a hack saw was used to make a deep groove in the base of the horn (Fig 6). This was followed by chiselling of the entire base. The skin at the posterior part of the horn was separated after the horn was made loose from its base. After raising the flaps, the interior of the horn base was thoroughly irrigated with potassium permanganate solution and they were approximated with horizontal mattress sutures (Fig 7).

A similar modified flap method has also been adopted in Jaffarbadi buffaloes by Mahida *et.al*. (2010) and Ramarao *et. al*, (2014). Graf and Senn (1999) and Kupczyski *et.al* (2014) observed that, dehorning, affected the animal's physiology (e.g. increased heart rate and plasma cortisol concentration) and behaviour (e.g. greater frequency of head shaking and rubbing) in a manner typical of an acute stress response. In the present study, a transient and reversible decline in milk yield for a couple of days was observed in the immediate postoperative period.

5. Horn cancer

Horn cancer is a sporadic, malignant disease affecting the horn core epithelium and predominantly seen in aged zebu bullocks and rarely in buffaloes (Somavanshi, 1991 and Kumar and Thilagar, 2000). It is comparatively very low in its incidence with 0.29 per cent (n=3 out of 1,022) in buffaloes; whereas it affects approximately 1% of cattle population (Naik *et.al*, 1989). There was a huge swelling around base of the horn. The swelling was hard in consistency. The horn became loose and shaky with loss of rigid orientation (Fig 8). The physical condition of the animals at the time of presentation was not alarming. But on consequent reviews, the physical condition of the animals was found deteriorated significantly. There was excess growth of the horn tissue in one animal (Fig 9). Symptoms like chronic nasal discharges, constant shaking of head, tilting of head to a side etc. were noticed.

The clients of two animals were reluctant for further diagnosis and treatment and hence, they were salvaged at a throw away prices. In the third buffalo, amputation by flap method was carried out which revealed cauliflower like growth at the time of surgery (Fig 10). Much research was done on prevention of cancer to the other horn, when one was already affected. After amputation of the cancerous horn, application of 5% liquor formaldehyde (Pandya, 1932) or radium therapy with deep X- rays by implanting radium needles in the horn cavity (Joslin, 1972) or immunization with an autogenous vaccine (Pachauri and Singh, 1978) or cauterisation with copper sulphate and chemotherapy using vincristine was (Udharwar *et. al*, 2008) were recommended.

6. Maggot wounds

Maggot wounds are occasionally reported in horns. Twenty two out of 1,022 (2.15%) buffaloes had maggots in the horns. Among these, 60% (n=13) were neglected cases of fractures, fissures or septic horn. The remaining cases (n=9) had maggotted wounds during the post-operative period following amputation of horn. Dehiscence of suture line was observed in a period of 2 to 7 days after surgery. By the time the animals were presented, significant bleeding or abundant blood clots were identified. The maggots were found wriggling over the surface of the horn at its broken tip (Fig 11). A tampon of turpentine oil was kept at the place where maggots were moving and the same were manually removed. Oxytetracycline topical liquid was instilled in to base of the horn. A course of broad spectrum antibiotics and analgesics was executed. All the animals showed significant healing between 25 and 35 days. Mahida *et.al*. (2009) reported avulsion of the horn and septic horn and/or maggotted wound of the horn as the more prevalent horn affections in Surti and Mehasana buffaloes.

7. Overgrown horns

This is not a pathological condition by itself but it caused significant damage to the soft tissues over the head region (Fig 12). Among 1,022 buffaloes with various affections of horn, 49 (4.79%) were brought for trimming of the overgrown portions. There was a deep punctured wound over the dorsal aspect of the head, extending from skin up to the cranial vault. It is a common practice for the livestock farmers rearing buffaloes to get the overgrown horns trimmed periodically. After trimming the distal part of the horn by working with a hack saw, the tip was separated. The soft tissue wounds were treated as open wounds. Oheme and Prier (1974) suggested trimming of excessive horns as it might lead to pressure sores on head and at times may impair vision.

8. Septic horn

Septic horn is the third largest condition with 77 out of 1,022 (7.53%) cases. In this condition, the base of the horn was stubborn. The tip of the horn was broken with emission of discharges ranging from serous through serosanguinous to purulent (Fig 13). In a few cases, offensive smell was recognized. The major complaint from the owner of these animals was that, they were repeatedly striking their heads against hard objects. Another significant point was that, most of the animals affected with this condition had long and uncurled horns.

This condition was treated using chlorpheneramine maleate injection in all the animals. In 38 animals, oxytetracycline topical liquid was instilled in to the horn after clearing the discharges to the extent possible. In the remaining 39 animals, a course of parenteral antibiotics was also given besides topical treatment (Fig 14). However, in the latter group, response was comparatively favourable. Hence, it is recommended that, along with antihistamines and topical medication with oxytetracycline topical liquid, a course of broad spectrum antibiotics may also be included in the treatment regimen for septic horn in buffaloes. Mahida *et.al*. (2009) reported avulsion of the horn and septic horn and/or maggotted wound of the horn as the more prevalent horn affections in Surti and Mehasana buffaloes. Mistry (2009) reported that, the treatment of septic horns with *Clerodendron phomidis* and antibiotics for about one week was successful.

Conclusion: Affections of horns are common in buffaloes due to their ferocious and infighting nature. Among various conditions, the order of their frequency was, fracture, avulsion, septic horn, overgrown horns, fissures, maggotted wound and empyema of frontal and cornual sinus and cancer. Incidence of cancer of horn in buffaloes appears to be comparatively less. Amputation of horn by modified flap method was felt satisfactory for various conditions. Conservative method was also affective but was time taking and advisable in animals that do not sustain surgery. The remaining conditions are curable with earlier presentation, though it takes much time for healing.

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