

## ASSESSMENT OF THE EFFICACY OF PELVIS EXTERNAL IMMOBILIZATION DEVICE AND SHORT WAVE DIATHERMY IN THE MANAGEMENT OF PELVIC FRACTURES IN KIDS

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### ABSTRACT

Eighteen kids with pelvic fracture were divided into three groups containing six animals each. Fractures of the tuber coxae, wing of the ilium, tuber ischii and ischeal shaft were selected for the study and allotted randomly to each group. First group was treated by medications. Second group was treated by medication and Short Wave Diathermy. Third group was treated by medication and Pelvis External Device Immobilization. All the animals were tested based on the parameters like recumbence, weight bearing, pain perception and radiographic bone healing for six weeks period. Results revealed that Diathermy group developed complete bridging callus in three animals and Pelvis External Immobilization group developed complete bridging callus in five animals. This study revealed that even though diathermy helps in pelvic fracture healing, Pelvis External Immobilization favors better fracture healing.

**KEYWORDS :** Pelvic fracture, kid, Pelvis External Immobilization Device, Short Wave Diathermy

### INTRODUCTION

Pelvic fractures are common in kids grown in city limits. Poor people rearing goats in cities are unable to provide proper shelter for their goats and mostly the goats are kept untied near the roads. This ultimately leads to traumatic fractures in goats in the form of automobile accidents. Slipping while grazing on hill sides (54 per cent), playing or gamboling (24 per cent), automobile accidents (18 per cent) and trapping of limbs in wire enclosures (4 per cent) are the causes of such fractures (Smith and Sherman, 2009). Pelvic fracture management in small ruminants is still in the primitive stage that no good surgical implants are available for pelvic fracture management and the available implants of canines are so costly that the poor owners can't afford. Most animals (75 per cent) with pelvic fractures would recover without surgery especially in small sized animals (Denny and Butterworth, 2000). Internal fixation techniques described for pelvic fracture repair of small animals were not suitable for ruminants (Singh *et al.*, 1993). So, ultimately kids met with pelvic fractures, are managed either by physiotherapy like Short Wave Diathermy or given complete rest. The use of diathermy to stimulate the repair of fractures had been advocated and condemned by many (Hutchison and Burdeaux, 1951), but the actual effects of Short Wave Diathermy on bone repair had not been studied systematically. We modified the Thomas Splint into Pelvis External Immobilization device and compared the efficacy of the device and Short Wave Diathermy in the management of pelvic fracture repair.

### MATERIALS AND METHODS

Kids less than six months old referred to Large Animal Clinic, Madras Veterinary College Hospital with the complaint of automobile accident were screened clinically and radio graphically for pelvic fracture for one year period (January - December 2010) and were selected for the study. Cases with only closed pelvic fracture had been taken for the study and pelvic fracture cases with additional long bone fractures were avoided to maintain the uniformity. Only fractured cases of tuber coxae, wing of ilium, tuber ischii and ischeal shaft were included randomly for the study. All cases underwent regular neurological examination to rule out nerve injury.

Cases were divided into three groups. Minimum of 6 kids were included in each group irrespective of sex and specific age (common age is less than 6 months). The first group was maintained with only medication and given complete rest. This group served as control group. Medications given were syrups or tablets containing calcium, Vitamin D, Vitamin C and Vitamin K. Medications prescribed were same for all the groups. The second group was managed by giving medications and Short Wave Diathermy for a period of 10 minutes for continuous 10 days. Again second dose of diathermy given after one week break. The owners who can brought their animals daily to treatment were selected for this group study. The third group was managed by the medication and Pelvis External Immobilization Device which was developed by us.

Pelvis External Immobilization Device was made by using Aluminium hangers. With the use of hangers, bilateral Thomas Splint was made for both the hind limbs and both the Thomas Splints were connected dorsally by a curved piece of hanger. Over this a complete cotton padding was applied and fixed to the fractured pelvis of the kid. Even complete recumbent kids with pelvic fracture could be able to stand for a few minutes while using this device.

**Photo 1: Kid treated for pelvic fracture made to stand using pelvic external immobilization Device.**



For a minimum of 6 weeks the kids were observed and results of each group were recorded at first, second, fourth and sixth weeks periodically. The following parameters were studied .

**A.** Recumbence of the animal during first, second, fourth and sixth week periods.

(L - Lateral recumbence, D - Dorsal recumbence, S - Standing posture, W - Walking or gait)

**B.** Weight bearing ability by both the hind limbs (Score 0-4) (0 - No weight bearing, 1 - trying to

bear weight, 2 - mild to moderate weight bearing, 3 - good weight bearing, 4 - complete weight bearing)

**C. Pain perception at the pelvic area (Score 0-3)**

(0 - No pain response, 1 - presence of mild pain, 2 - presence of moderate pain, 3 - presence of severe pain)

**D. Radiographic evidence of fracture healing (Score 1-4) (Piermattei *et al.*, 2006)**

(Radiographic interpretations 1 - Pelvic fracture margins are visible, 2 - Pelvic fracture margins are indistinct and mild fracture gap is visible, 3 - Patchy mineralization of bridging callus visible and trace of fracture line is visible, 4 - Bridging callus of even density and smooth borders and faint fracture line visible or not visible)

## **RESULTS AND DISCUSSION**

In group one (medication group) , two animals were able to stand for sometime after 6 weeks and one animal was able to walk for some distance. Good weight bearing ability was seen in the walking animal. There was no pain reflex at the end of six weeks in all the animals. Three animals developed bridging callus of even density and smooth borders and no fracture line was visible at the fractured site indicated complete fracture healing.

In group two (Medication + Short Wave Diathermy) , three animals were able to stand at sixth week with good weight bearing and two animals were able to walk with complete weight bearing. There was no pain reflex noticed at the end of sixth week in all the animals. Three animals developed complete bridging callus at the fractured site.

In group three (Medication + Pelvis External Device Immobilization) , two animals were able to stand for some time and three animals were able to walk for some time. Complete weight bearing was noticed in two animals and good weight bearing was noticed in three animals. Pain reflex was absent in all the animals from fourth week onwards. Except one animal, all the animals developed complete bridging callus at the fractured site.

The prognosis following a pelvic fracture depends on its location and the degree of obturator nerve damage (Singh *et al.*, 1993). The prognosis is poor in case of multiple fractures and if the obturator nerves are injured. In our study, initial neurological study grouped out the neurological patients. So, all cases represented typical model to assess the pelvic fracture healing ability.

In short wave diathermy, high frequency alternating current at a frequency of approximately 27 million cycles per second was used. Use of short wave diathermy for bone healing is not a new concept. Diathermy does not produce chemical burn and stimulate motor or sensory nerves. Heat increases the tissue temperature which leads to sedation and analgesia. The bone is having low water content and does not heat as much as surrounding moist tissues. Heat also has vasodilating effect which increased the number of phagocytes to the area thus helps the healing process (Sobti, 1993). So, fracture induced soft tissue swelling and pain will be controlled by diathermy. Because of the vasodilatation effect inflammatory phase or first stage of bone healing promoted. In fracture healing the diathermy helped by producing considerable amount of callus formation but the bones were osteoporotic (Hutchison and Burdeaux, 1951). Usefulness of electrical stimulation in the treatment of delayed and nonunion fractures is evident (Christina *et al.* , 2010). Pulsed Short Wave Diathermy was able to stimulate osteogenesis (Goldin *et al.*, 1981). Our study of group two pelvic fracture treatment using diathermy also correlated with the above findings by producing complete bridging callus in three animals and three animals with patchy mineralization callus formation. Thus short wave diathermy helped in fracture healing.

The control mechanism that modulates the bone cell behavior is believed to be electrical. Electronegativity of the bone cell behavior favors osteoblastic activity whereas, electropositivity of the bone cell behavior favors osteoclastic activity. The fractured bone surface under stress is electronegative and fractured bone surface under strain is electropositive (Singh *et al.*, 1993). Strain is the relative change in shape or size of the bone due to externally applied forces. Stress is the internal force associated with a strain. Results explained that in the third group using Pelvic External Device Immobilization, most of the animals radiographically scored four with bridging callus of even density and smooth borders and without fracture line or faint fracture line visibility. This showed that when we used Pelvic External Immobilization Device fractured bone surface got stress not strain thus favored electronegativity which ultimately changed the behavior of the cells to osteoblastic activity and bone callus forms with even density. Whereas in other two groups with mild strain did not favor good callus formation. Based on this study it was concluded that the Pelvic External Immobilization Device favored bone healing better than other two groups.

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