The Pharma Innovation Journal 2022; SP-11(11): 1231-1233

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(11): 1231-1233

www.thepharmajournal.com
Received: 02-08-2022
Accepted: 06-09-2022

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Post-operative functional assessment by owner's feedback for hip dysplasia in dogs

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Abstract
Most of the dogs with hip disorders which are not responding to medical therapy are treated by salvage surgical procedures to alleviate pain, thereby improving the limb function and quality of life. All the dogs with varying degree of hip dysplasia under the study were grouped into three groups, group I, group II and group III considering the age, degree of dysplasia and subluxation and luxation. Excision arthroplasty was done in group I dogs where femoral head and neck was excised and joint capsule was sutured to prevent bone contact between femur and acetabulum. Denervation done in group II dogs wherein craniodorsal gluteal nerves on acetabular rim were destroyed using bone curette. Trans-femoral articular wiring was done in group III dogs for subluxated and luxated hips using nylon wiring. The functional assessment of all operated dogs were assessed by WOMAC (Western Ontario and Mcmaster University Osteoarthritis Scoring Index) score and followed up to 16 weeks after obtaining owner's feedback during 1st, 2nd, 4th 7th,10th and 15thweek post operatively (Annexure I). Operated dogs were followed up to 16 weeks after the surgery by considering the owners satisfaction over the telephone regarding the animal activity like getting up, climbing the stairs, chair, walking, sleeping. WOMAC score was reduced by higher score by end of 16th week in excision arthroplasty group, moderate reduction in denervation group and lower reduction in trans-articular group suggesting moderate to good improvement, moderate improvement and less moderate to moderate improvement in Group I, Group II and Group III respectively.

Keywords: Denervation, excision arthroplasty, hip dysplasia, trans-femoral articular wiring

Introduction
Canine hip dysplasia (CHD) is defined as a disease that stems from a varying degree of laxity of hip joint permitting sublimation during early life, giving rise to varying degrees of shallow acetabulum and flattening of femoral head, finally inevitably leading to osteoarthritis (Smith *et al*. 2012) [1]. There are no specific surgical therapeutic treatment available till date. Salvage surgical procedures can be performed where conservative management fails to result in adequate clinical improvement (Anderson, 2011) [2]. The surgical options recommended for each dog differ depending on age and clinical signs (Harper, 2017) [3]. In the present work the salvage procedures performed was assessed by functional assessment of all operated dogs by using WOMAC score as per method of Iwata *et al*. (2008) [4] by considering animal activity like getting up, climbing stairs, walking sleeping etc.

Materials and Methods
The study was carried out among clinical cases suffering from hip dysplasia, luxation and subluxation presented to Department of Surgery & Radiology, College of Veterinary Science, Gannavaram and Hassan. The dogs with above ailments were subjected to surgical salvage procedures considering age, risk of anesthesia etc. A total of 18 clinical cases of dogs with hip dysplasia were selected and divided into three groups of six dogs each for further.
Group I -Excision Arthroplasty: Dogs of age one year and above that are not responding to medical treatment were considered for excision arthroplasty procedure under standard anesthetic and operative procedures.
Group II - Denervation: Dogs with severe pain, higher body weight animals were considered for denervation procedure under standard anesthetic and operative procedures.
Group III - Trans-femoral articular wiring: Dogs with age one year and below one year, slightly dysplastic (increased joint space incongruent), subluxated and luxated hip were considered for trans-femoral articular wiring procedure under standard operative procedures.

Functional assessment by Owners Assessment Questionnaire (WOMAC Score) was done in all the dogs during 1st, 2nd, 3rd, 4th, 7th and 15th week post operatively by WOMAC score as per Iwata *et al*. (2008) [4] considering physical parameters such as stiffness of muscles in morning or after rest, trouble in climbing stairs, posture in toileting, symmetry when sitting down, sleep disruption, vocalization at rest, exercise intolerance, severity of limping, Off leash activity, ease of jumping, distance the pet walk on leash with comfort, and giving scores as 0, 1, 2, 3, 4 for none or never, mild, moderate, severe and extreme respectively from the animal owners (Table 1). The significant difference between the surgical treatment group is analyzed by one way ANNOVA.

Table 1: Score card for Functional assessment of lameness in dogs by Owners Assessment Questionnaire (WOMAC Score)

S. No	Physical functional assessment scoring	0	1	2	3	4
1	Experience stiffness in morning or after rest	None or never	Mild	Moderate	Severe	Extreme
2	Has trouble in climbing stairs	None or never	Mild	Moderate	Severe	Extreme
3	Posture of toileting	None or never	Mild	Moderate	Severe	Extreme
4	Symmetry when sitting down	None or never	Mild	Moderate	Severe	Will not flex
5	Sleep disruption	None or never	Mild	Moderate	Severe	Extreme
6	Vocalization at rest	None or never	Mild	Moderate	Severe	Extreme
7	Exercise intolerance	None or never	Mild	Moderate	Severe	Extreme
8	Severity of limping	None or never	Mild	Moderate	Severe	Not using the leg
9	Off leash activity	Back to normal	Mild	Moderate	Severe	Reluctance to run
10	Ease of jumping	None or never	Mild	Moderate	Severe	Extreme
11	Distance the pet walk on leash with comfort	Distance	3 km	500m	250m	<100m

Results and Discussion

The preoperative WOMAC scores in all dogs before surgery were 36±0.89, 34±1.03, 38.33±0.33 in Group I, Group II and Group III respectively. Post operatively the scores were reduced by 3.5±0.22, 2.67±0.61, 3.33±0.49, 4±0.82, 3.33±0.49 and 16.83±1.35a from 1st, 2nd, 4th, 7th, 10th and 15th, respectively in Group I dogs, In group II dogs scores were reduced by 4.33±0.33, 3.17±0.31, 3.67±0.33, 2.17±0.48, 2.17±0.4 and 15.5±0.96a from 1st, 2nd, 4th, 7th, 10th and 15th, respectively and in Group III dogs scores were reduced by 2.83±0.4, 1.5±0.5, 1.5±0.56, 2±0.58, 2±0.77 and 11.5±0.96c from 1st, 2nd, 4th, 7th, 10th and 15th, respectively. The pre-operative scores reduced gradually in all the three procedures. The reduction at 15th week was 16.8, 15.5 and 11.5 in group I, group II and group III respectively. The reduction was significantly higher in Group I and II compared to group III (Table 2). The owners of Group I and Group II dogs expressed satisfaction over the activity of the dog as compared to group III dog owners. Operated dogs were followed up to 16 weeks after the surgery by considering the owners satisfaction over the telephone regarding the animal activity like getting up, climbing the stairs, chair, walking, sleeping etc and majority of the owners of dogs undergone excision and denervation procedures expressed satisfaction.

The functional assessment in excision arthoplasty group evidenced by dog bearing weight by as early as 4 weeks in two dogs and near normal gait in all dogs by seven months. WOMAC score at the end of 15th week was reduced by higher score from beginning suggesting moderate to good improvement. Gendreau and Cawley (1977) [5] found that most dogs which underwent excision arthroplasty started bearing weight by 2nd week and by 4-6 week moderately and by 2-3 months complete recovery. Arunprasad (2013) [6] found recovery near normal function from 2-6 months in his study.

In denervation group dogs, functional assessment evidenced by reduction in the WOMAC score moderately suggesting moderate improvement. Braun *et al*. (2003) [7] observed 69.23% with no lameness or signs of pain and 26.92% of dogs with slight lameness after denervation. Rocha *et al*. (2013) [8] observed reduction of pain in 10% of dogs after 48 hrs, 60% after 7 days. 70% after one month, 80% after 2 months after acetabular denervation.

In trans-femoral articular group dogs, functional assessment evidenced by lower reduction of WOMAC score suggesting discomfort in ambulation, mild lameness, improper weight bearing etc. After 15th week after surgery functional assessment was less moderate to moderate in all the dogs.

Table 2: Functional assessment scoring (WOMAC) Score by owners assessment questionnaire

Hip Disorder		Post operative-reduction in score					Total reduction in score
	Score in the beginning	1st	2nd week	4th week	7th week	10th week	15th week
I	36±0.89	3.5±0.22	2.67±0.61	3.33±0.49	4±0.82	3.33±0.49	16.83±1.35^{a}
II	34±1.03	4.33±0.33	3.17±0.31	3.67±0.33	2.17±0.48	2.17±0.4	15.5±0.96^{a}
III	38.33±0.33	2.83±0.4	1.5±0.56	3.17±0.6	2±0.58	2±0.77	11.5±0.96^{c}

The column values bearing different superscript differ significantly at 0.05%

Conclusion

Functional assessment by evaluation of owner's questionnaire evidenced by end of 16th week, reduction in WOMAC score in excision arthroplasty, denervation and trans-articular wiring group by 16.5,15.5 and 11.5 suggesting more comfort in excision arthroplasty group than denervation and transarticular group.

Acknowledgments

KVAFSU, BIDAR and SVVU, Tirupati for providing opportunity to conduct research under sandwich programme.

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