UNIVERSITI PUTRA MALAYSIA

A RETROSPECTIVE STUDY OF PELVIC LIMBS FRACTURE MANAGEMENT IN AVIAN SPECIES PRESENTED TO UNIVERSITY VETERINARY HOSPITAL (UVH) UNIVERSITI PUTRA MALAYSIA

DR.SITI SARISMAHANIM BINTI ISMAIL

FPV 2014 5

A RETROSPECTIVE STUDY OF PELVIC LIMBS FRACTURE MANAGEMENT IN AVIAN SPECIES PRESENTED TO UNIVERSITY VETERINARY HOSPITAL (UVH) UNIVERSITI PUTRA MALAYSIA

By

DR.SITI SARISMAHANIM BINTI ISMAIL

Thesis Submitted to the School Of Graduate Studies, Universiti Putra Malaysia, in the Fulfillment of Requirements for the Degree of Master of Veterinary Medicine

2014

Copyright

Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requiremnet for the degree of master of veterinary medicine

A RETROSPECTIVE STUDY OF PELVIC LIMBS FRACTURE MANAGEMENT IN AVIAN SPECIES PRESENTED TO UNIVERSITY VETERINARY HOSPITAL (UVH), UNIVERSITI PUTRA MALAYSIA

By

DR. SITI SARISMAHANIM ISMAIL

2014

Supervisor: Assoc. Prof. Dr. Jalila Abu, PhD

Co-Supervisor: Dr. Lau Seng Fong, PhD

Faculty: Faculty of Veterinary Medicine

In Malaysia, Avian Orthopedic is a remote field in Veterinary Medicine therefore most of the cases will be referred to University Veterinary Hospital (UVH), Universiti Putra Malaysia for further diagnostic work out and treatment. This is a retrospective study to determine the common pelvic limbs fracture cases in avian species presented to UVH form year 2009 to 2013 and to study the clinical pattern of each management of pelvic limbs fracture and the outcome of each management and factor influencing the outcome. For this study, the data was chosen from the birds (pets or wild birds) that presented with pelvic limbs fracture from year 2009 to 2013 (5 years).Patient Medical Record (PMR) for each case was carefully assessed retrospectively. Radiograph was not available for all cases; therefore PMR was used as the main information data. The main

data collections for this study were subdivided into four categories; patient data, fractured bone data, clinical management data, healing progress and outcome data. Results were analyzed using software IBM®SPSS® Statistics 20 System © Copyright IBM Corporation 1989, 2011. There were 36 birds (pet and wild birds) with 47 fractured limbs with complete inclusion criteria being evaluated in this study. The findings showed that the most common fractured bone was tibiotarsal (n=36/47 [78.72%]). The stabilization fractures method chosen, were highly significant with the body weight of the birds (*P*= 0.002) and the duration of fracture (fracture's age) *P* Value was below 0.001. There are no significant differences of fracture stabilization method between pet birds and wild birds, between type of fracture or bone involved. 98% (n=46/47) of birds healed, from that 98%, 49% (n=23/47) healed within 3 to 6 weeks post stabilization. Healing period and target of healing (3 to 6 weeks) was significantly correlated with the duration of fractured bone, total number of fracture sites per bird, fracture types (open or close fracture), clinical management inclusive of stabilization method, supportive medication; antibiotic, anti-inflammation and nerve supplement (*P*<0.050). Meanwhile 60% (n=28/47) had an excellent therapy outcome. In conclusion, a successful of clinical management of avian species fracture lies on various factors, the correct stabilization method with supportive treatment will increase the chances of a successful healing with excellent therapy outcome. Close fracture, short duration of fracture, and a single fracture site will increase the healing process.

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia

sebagai memenuhi keperluan untuk ijazah Master Peubatan Veterinar

KAJIAN RETROSPEKTIF MENGENAI PENGURUSAN DAN RAWATAN FRAKTUR TULANG KAKI PELVIS PADA AVIAN DI HOSPITAL VETERINAR UNIVERSITI (HVU), UNIVERSITI PUTRA MALAYSIA

Oleh

DR. SITI SARISMAHANIM ISMAIL

2014

Penyelia: Prof. Madya Dr. Jalila Abu, Phd

Penyelia Bersama: Dr. Lau Seng Fong, Phd

Fakulti: Fakulti Perubatan Veterinar

Di Malaysia, bidang ortopedik avian adalah salah satu cabang perubatan dan pembedahan veterinar yang amat terpecil, oleh itu HVU menerima bilangan kes sebegini dengan kadar yang agak tinggi untuk saringan diagnostic mahupun rawatan lanjut. Ini adalah kajian retrospektif selama 5 tahun (2009-2013) bagi menentukan jenis atau lokasi tulang kaki pelvis yang lazimnya patah di dalam kes avian dan mengkaji pengendalian atau pengurusan perubatan untuk setiap kes dan mengkaji hasil dan faktor yang mempengaruhinya. Untuk projek ini, data diambil daripada kes fraktur tulang kaki pelvis bagi kes burung merangkumi semua kategori (burung liar dan burung peliharaan). Rekod Kesihatan Pesakit (RKP) bagi setiap kes dianalisa secara retrospektif dengan teliti. Tidak semua kes mempunyai radiograf, dengan itu RKP digunakan sebagai data utama.

Data ini kemudiannya di bahagikan kepada 4 kategori iaitu; data pesakit, data fraktur tulang pelvis, data pengurusan klinikal, data proses penyembuhan dan hasil rawatan. Data dianalisa menggunakan perisian daripada *IBM®SPSS® Statistics 20 System © Copyright IBM Corporation 1989, 2011.* Sebanyak 36 ekor burung (Burung Liar dan Burung Peliharaan) dengan 47 tulang pelvis patah yang lengkap kriteria telah dianalisa di dalam kajian ini. Hasil analisa menunjukkan tulang tibiotarsal (n=36/47 [78.72%]) adalah tulang yang paling lazim pada avian yang terlibat dalam masalah fraktur. Pengurusan klinikal ataupun cara klinikal merawat masalah fraktur, yang dipilih di HVU adalah berkaitrapat dengan berat badan dan saiz burung dimana, statistic menunjukkan signifikasi ketara (P= 0.002). Jangkamasa fraktur juga menunjukkan signifikasi ketara nilai P adalah kurang daripada 0.001. Tiada perbezaan signifikasi dalam rawatan fraktur bagi kategori burung (Burung Liar dan Burung Peliharaan), jenis fraktur, mahupun jenis tulang yang terlibat. 98% (n=46/47) sembuh dari masalah fraktur dan dari 98% itu, 49% (n=23/47) telah sembuh di dalam anggaran jangkamasa 3 ke 6 minggu selepas rawatan. Jangkamasa sembuh dan sasaran jangkamasa sembuh (3 hingga 6 minggu) adalah berkaitrapat dan mempunyai signifikasi ketara dengan, jangkamasa fraktur, bilangan nombor fraktur pada seekor burung, rawatan klinikal masalah fraktur, rawatan sokongan seperti antibiotik, ubat keradangan dan ubat tahan sakit, dan ubat saraf (P<0.050). Pada masa yang sama, 60% (n=28/47) mendapat hasil terapi yang terbaik. Kesimpulannya, kejayaan rawatan dan pengurusan klinikal fraktur dalam avian bergantung pelbagai faktor. Pemilihan cara rawatan dan pemberian rawatan sokongan yang tepat dapat meningkatkan kejayaan rawatan. Fraktur jenis tertutup, jangkamasa fraktur yang pendek dan satu fraktur lokasi dalam seekor burung dapat mempercepatkan masa penyembuhan.

ACKNOWLEDGEMENT

Assalammualaikum,

First and foremost, I would like to thank Allah The Almighty, for giving me the strength and patience to finish this project. I also take this opportunity to express my profound gratitude and deep regards to my guide Associate Professor Dr. Jalila Abu for her exemplary guidance, monitoring and constant encouragement throughout the course of this thesis. The blessing, help and guidance given by her time to time shall carry me a long way in the journey of life.

I also take this opportunity to express a deep sense of gratitude to Dr. Lau Seng Fong (my Co-Supervisor) and Prof. Dr. Mohammed Ariff Omar, for their cordial support, valuable information and guidance, which helped me in completing this task through various stages.

At this juncture I feel deeply honored in expressing my sincere thanks to Dean, Deputy Dean of UVH and the HOD of Department of Companion Animal Surgery and Medicine, Faculty of Veterinary Medicine for making ways for me to do my master program and providing valuable advocacy leading to the successful completion of my project.

To the love of my life, my dearest husband and daughter; Mr. Alan and Miss Yaya, who put up with me through thick and thin. Thank you so much for the du'a, encouragement and moral support. Last but not least I would like to pay my gratitude towards my parents, brother, sisters, family and friends (especially to dearest May Lyn, LA vets and all MVM clan's 2014) for their constant du'a, comfort and love without which this completion of assignment would not be possible.

When the world says 'Give Up', Hope whispers 'Try it one more time'

TABLE OF CONTENTS

LIST OF TABLES

List of Figures

LIST OF ABBREVIATION

ESF	External Skeletal Fixation
GA	General Anaesthesia
IM Pin	Intramedullary Pin
LA	Local Anaesthesia
MRJB	Modified Robert Jones Bandage
PMR	Patient Medical Records
RJB	Robert Jones Bandage
TIF	Tie in Fixator
UPM	Universiti Putra Malaysia
UVH	University Veterinary Hospital

Chapter I

Introduction

1.1 Background

Pelvic Limbs of birds consist of femur, tibiotarsus, tarsometatarsus, and phalanges. The relatively different structure, morphology and the uniqueness of bird's bone make the fracture management in avian contra distinct to other species of animals. As an adaptation for flight, avian bones are designed to be thin and light (Eshar and Briscoe, 2009) and with the fact that these bones have minimal soft tissue coverage, commonly results in bone fragmentation on impact (Bennet, 1992; Eshar and Briscoe, 2009). In Malaysia, avian orthopedic is a remote field in Veterinary Medicine therefore most of the cases will be referred to University Veterinary Hospital (UVH), Universiti Putra Malaysia for further diagnostic work out and treatment. Trauma of pelvic limbs in avian species is one of the most common orthopedic problems that commonly presented to UVH. Various pet birds and wild birds' species were referred to UVH with leg fractures due to traumatic injuries. This situation was supported by McLuggage (1997) and Stejskal et al. (2011) where tibiotarsal fractures are among the most common orthopedic problems encountered in caged birds. It is suggested that bone fractures can heal faster in birds than in mammals. Newton and Zeitlin (1977) reported that various fractures and fixation methods in avian fractures repaired showed that the fractured avian bones can form a stable callus within 3 weeks and have complete bone remodeling within 5 weeks post treatment. Avian fracture healing is dependent on the amount of displacement, the integrity of the blood supply, the presence of infection and the degree of motion at the site of the fracture (Bennett & Kuzma, 1992). An External fixation, with coaptation or Kirschner-Ehmer splints, is a viable treatment for many fractures in captive and wild birds (MacCoy, 1992; Redig, 1986). Internal fixation can be apply to certain condition and depends on species of birds. Most fractures of the tibiotarsus are best treated with internal stabilization, especially in larger birds due to weight bearing factors (Bennet, 1997 and Stejskal, 2011) where as in small birds may be managed with coaptation or splinting (MacCoy, 1992). At UVH, pelvic limbs fractures are commonly presented and therefore further assessment on the outcomes of the fracture cases need to be further evaluated.

1.2 Problem Statement / Justification

The information on avian fracture management's technique is still lacking in Malaysia. Currently, there is an increasing number of avian, exotic pet owners and the awareness of public on injured wildbirds.

1.3 Objectives

Based on the problem statement, the objectives of this study are;

I. To determine common pelvic limbs fractures cases in avian species presented to UVH from year 2009 to 2013

II. To study the clinical managements of each pelvic limbs fracture

III. To evaluate the outcome of each fracture management and factors influencing the outcome

1.4 Hypothesis

Avian bone healing of pelvic limbs fracture is expected between 3 to 6 weeks post stabilization, based on type of bird (pet birds and wild birds) and type of fractures and the location.

1.5 Outline of Thesis

In this **Chapter I: Introduction**; a brief description of project is presented. Followed by a presentation of the problem statement and objective of the system. The outline of the thesis is as follows.

In **Chapter II: Literature Review**, an overall assessment and different theories related to the study is presented. It consists of review or related fields and technique.

In **Chapter III: Methodology,** covered the study design and implementation of retrospective study inclusive the statistical analysis method and programmed involved.

In **Chapter IV: Results**, this section explained the finding based on the objectives listed. The statistical evaluation and findings will be documented in this chapter.

In **Chapter V: Discussion**, a thorough assessment on the findings will be discussed in this chapter.

A **Conclusion** of the study will be discussed in **Chapter V**.

References

1. AlexanderR. Mc.N. (2004). *Bipedal animals and their differences from humans. Journal Anatomy* 204(5): 321–330.

2. Avian Orthopedic retrieved March, 2014. http://c.ymcdn.com/sites/www.michvma.org/resource/resmgr/mvc_proceedings_2014/bennett_03.pdf

3. Bennett, R. &Kuzma, A. (1992). *Fracture management in birds. J. Zoo Wildlife Med* 23: 5-38

4. Bob Donely Avian Orthopedic in: *Avian medicine and surgery in practice-companion and aviary birds*. Manson Publishing Limited, 2010 1: pp 266-290

5. Bowles.H.,Lichtenberger.M, and Lennox.A. (2007). *Emergency and critical care of pet birds. Journal of Veterinary Clinic North America: Exotic Animal Practice* 10(2): 345-394

6. Cottrell J. and O'Connor P.J. (2010). *Effect of non-steroidal anti-inflammatory drugs on bone healing.pharmaceuticals* 3: 1668-1693

7. Cubo.J, and Casinos A. (2000). *Incidence and mechanical differences in pneumatized bone in the long bones of bird. Zool. J.LinnScc* 130:499-510

8. Eshar, D.; Jeleen A Briscoe, A.J. (2009). *External coaptation using a tape splint for treatment of distalpelvic limb fractures in small birds. Lab Animal* 38(8):262-263.

9. Gaston M.S. and Simpson A.H.R.W. (2007). *Inhibition of fracture healing. J.Bone Joint Surg.[Br] 89(B): 1553-1560*

10. Harcourt-Brown NH (2002). *Orthopedic conditions that affect the avian pelvic limb .Vet Clin North Am ExotAnimPract* Jan;5(1):49-81

11. Hawkin M.G., Murphy J.P. (2011). *Avian analgesia. Veterinary Clinics of North America Exotic Animal Practice* 14(1):61-80

12. Heide Van Der H.J., Hannick G., Buma P. Schreurs B.W.(2008), No Effect Of Ketoprofen And Meloxicam On Bone Graft In Growth: *A Bone Chamber Study In Goat.Acta Ortopendica.*79(4): 548-554
13. Helmer&Redig. (2013). *Surgical resolution orthopedic disorders clinical avian medicine* 2(34): 761-773

14. Hollamby.S.,Dejardin L.M.,Sikarskie.J.G., Haeger.J.(2004), *Tibiotarsal fracture repair in Bald Eagle (HaeliatusLeukocephalus) using and Interlocking Nail. Journal Of Zoo And Wildlife Medicine* 35(1):77-81

15. Islam.M.M, Biswas.D, Rhaman M.M, and Haque M.A (2002). *Effect of different fixation devices on fracture treatment and evaluation by radiography in birds. Journal of Biotechnology* 1(1) : 1-9

16. MacCoy D.M. (1992). *Treatment of Fractures in Avian Species. Vet Clin North Am Small AnimPract*Jan 22(1):225-38.

17. Marko Stejskal, BerislavRadišierislavRadišić, Marko PearkoPećin, DraženMatiraženMatičić, OzrenSmoleczrenSmolec, Mario KreszingerarioKreszinger, Boris PirkiorisPirkić andPeroKardumeroKardum.(2011). *Interlocking Nail for Tibiotarsal Fracture Repair in A Black Swan (Cygnus Atratus Cygnus Atratus) - A Case Report. Veterinary Archive* 81(6): 785-791

18. Mbugua S.W., Skoglund L.A, and Lokken P. (1989). *Effect of phenylbutazone and indomethacin on the post-operative course of following experimental orthopedic surgery in dogs. ActaVeterinariaScandinavica* 30(1): 27-35

19. McCluggage, D.M. Bandaging, in: Altman, R.B., Clubb, S.L. &Dorrestine, G.M.(Eds). *Avian medicine and Surgery*. Philadelphia, WB. Saunders, (1997), pp 828-834

20. McDonald D.L.[1], Jaensch S., Harrison G.J., Gelis S., Brennan D., Sacks P., Bernardo D. (2010).*Health and nutritional status of wild australianPsittacine birds: an evaluation of plasma and hepatic mineral levels, plasma biochemical values, and fecal microflora.J Avian Med Surg.* Dec;24(4):288-98

21. Michael D., Stephanie C.W.Yen. Klosowski M.M., Farke A.A., Hutchinson J.R. and Shefelbine S.S. (2012). *Whole bone scalling of avian pelvic limbs. Journal of Anatomy*, Jul 221(1):21-29

22. NeikkerkVan.J.L., Duis Ten H.J., Binnendijk B., Schoots F.J., Goris R.J.(1987). *Duration of fracture healing after early versus delayed internal fixation of fractures of the femoral shaft. Journal of Pub.Med* 18(2); 120-122

23. Newton, C. &Zeitlin, S. (1977). *Avian fracture healing. JAVMA* 170:620-625

24. Redig, P.T. Evaluation and nonsurgical management of fractures, in: Harrison, G.J. & Harrison S (Eds). *Avian Medicine and Surgery*. Philadelphia, W B Saunders, 1986 , pp 380-394

25. Redig. (1996) *Classification of Fracture of Avian Long Bone, Association of Avian Veterinarian*: 33-36

26. Souza, Fields and Degernes. (2004). *Thoracic and pelvic limb fracture and luxation management in raptors: a five-year retrospective study. Journal of Wildlife Rehab* 27(3-4) : 5-3

27. Staruss E.J et al., 2007. Does Obesity Influenced the Outcome After the Operative Treatment of The Ankle? 89(6): 794-798

28. Tully Jr. (2002). *Basic avian bone growth and healing .Exotic Animal Practice* 5(1) : 23-30

29. Tunio A., Jalila A., Goh Y.M. and IntanShameha. (2013). *Histological Of Transverse Fracture Healing In Pigeon.Res.Opin.Anim.Vet.Science*. 3(10):380-386

30. Tunio A., Jalila A., Goh Y.M. and Intan Shameha. (2014). *Experimental of fracture healing with external skeletal fixation in a pigeon ulna model. J.Adv.Anim.Res.*,1(2):58-64