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A Canine Hip Dysplasia Treatment with Total Hip Replacement in Golden Retriever Dog, Successful Outcome in Malaysia. Case Report

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ABSTRACT

Canine hip dysplasia is a common orthopedic disease in medium and large breed dogs. Conservative treatment was initiated and failed due to high medication intolerance and low response with poor hind limb lameness, Total Hip Replacement (THR) offers the best surgical solution. However, THR surgical technique and implant is still novel in Malaysia. This case report is the cementless biological THR at J B Animal Medical Clinic, marking the significant progress in Malaysia local veterinary orthopedic surgeon. A male Golden Retriever, weight 46 kg, age 3 year and 11 month was presented to the clinic for the right hind limb lameness and showed sign of pain and no respond on NSAID & condro protective medication. Radiograph was taken and the findings of bilateral canine hip displasia with the sub-luxation of the left side. Total Hip Replacement Surgery was decided and done on the left side, by using bionic hip implant and a cementless implant (Bluesao). Preoperative assessment was done include serum biochemistry, haematology and anaesthetic risk evaluation. Post operative care include controlled exercise, gait assessment, interval radio graph for constant monitoring. The dog tolerated well during surgery and post operative care commencement without any post operative complication. Weight bearing was seen as early as day 2 post operation without any hesitation to move and slow walk. After 3rd month, the dog demonstrated good weight bearing and gait symmetry. This case signify success treatment of canine degenerative joint disease. Appropriate case selection, surgical expertise and successful post operative care yield excellent result supports broader option in end stage hip dysplasia. However, cost and compliance remain important consideration for expanding availability.

1. Introduction

Replacement of the coxofemoral joint in dogs has been performed for more than three decades in both research and clinical practice [3]. Total hip replacement (THR), also referred to as total hip

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arthroplasty, is a salvage procedure frequently used in humans and dogs to address coxofemoral joint disease of various etiologies [9,14]. However, there was no relationship between age, sex, and breed for development of AVN (avascular necrosis) [10]. Although acute hip luxation can be managed with multiple methods, chronic hip luxation presents additional challenges, such as difficulty in repositioning, muscle contraction, re-luxation, and cartilage damage or loss. Consequently, treatment options for chronic luxation are often limited to femoral head and neck excision or THR [21]. Several implant systems with different configurations, including cemented and cementless components for both the femoral stem and acetabular cup, are available [19,21]. Functional outcomes in dogs are generally excellent when complications do not occur [8,15]. Animals with (CPF) capital physeal fractures treated by THR benefited significantly [12]. Ischiolial pinning has also been used for stabilisation of coxofemoral luxations in dogs [1].

This study describe the first case of reported of chronic hip luxation in a golden retriever manage by THR using BlueSAO® Bionic Hip system. A 3 year 7 month old, neutered, male golden retriever weighing 47.15kg presented with unability to walk for more than 3 month. Orthopedic examination revealed moderately discomfort during manupulation of the left hip joint. Radiographic examination revealed craniodorsal chronic hip luxation (Figure 1).

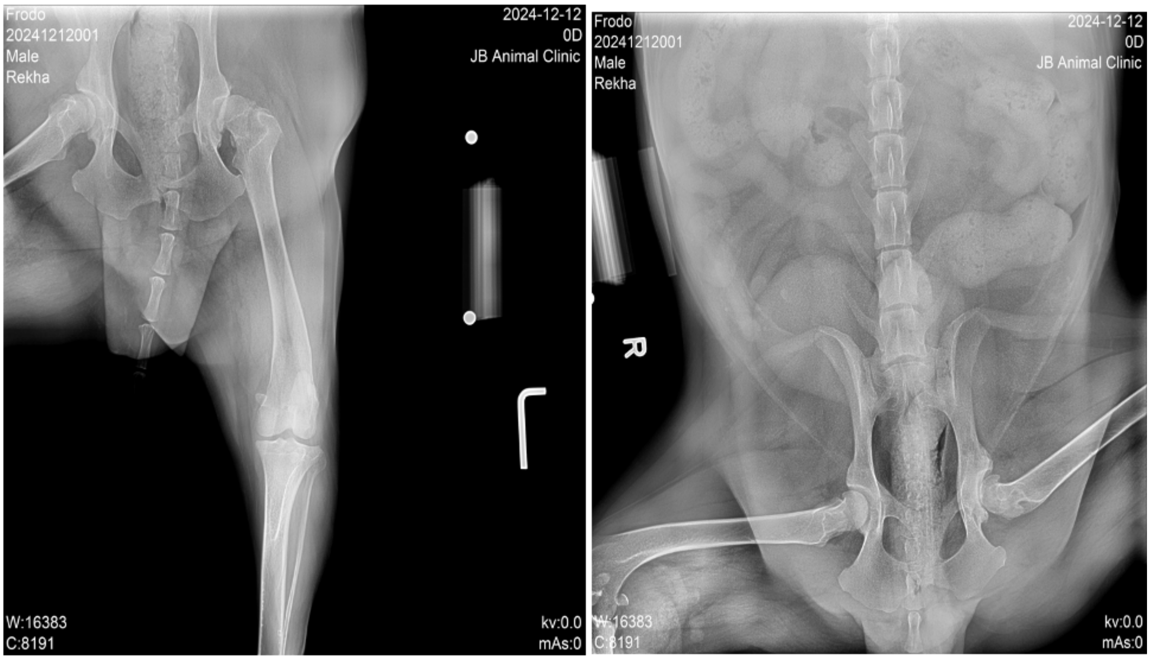

Fig. 1. Preoperative ventral dorsal radiographs showing craniodorsal hip luxation

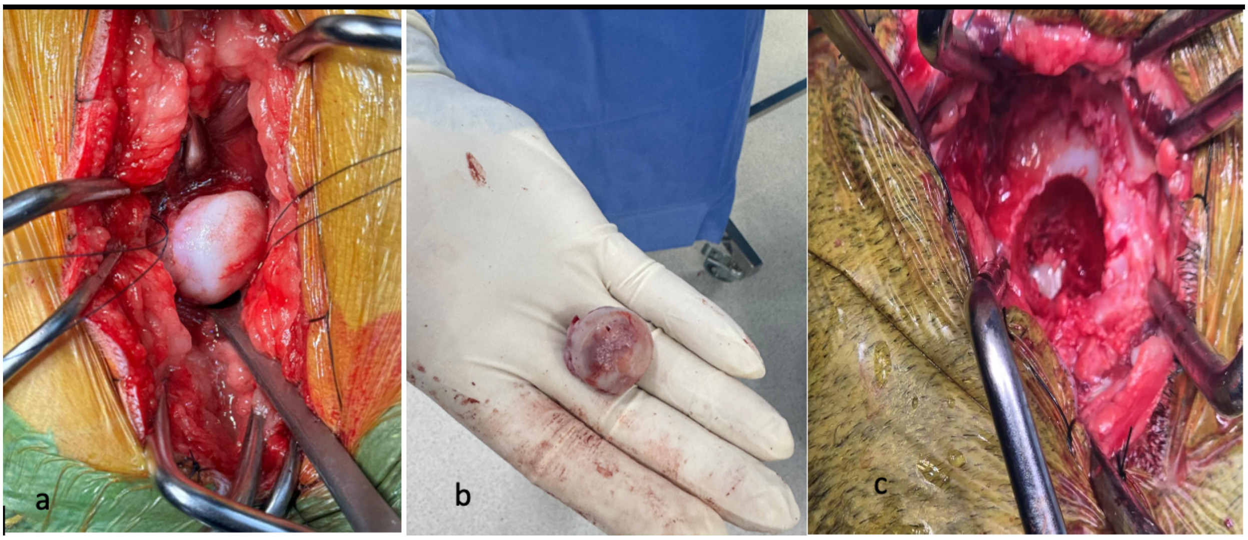

Fig. 2. Thinning & cartilage loss at the femoral head(a,b). Severe osteophytes engulfing the acetabulum with very thick coxofemoral joint capsule (c)

2. Methodology and Case Description

Several conservative treatment consisting of using oral medication of condro protective medicine, pain control, laser and accupuncture has been attempted unsuccessfully by various veterinarian before referral. Therefore, THR by BlueSAO Bionic system was performed after discussion various treatment option with the owner. Premedication included buprenorphine (0.5 mg/kg IV) and midazolam (0.1 mg/kg IV). Subsequently, anesthesia was induced with propofol (4 mg/kg IV) and maintained with isoflurane (1000 mg/g). Lateral recumbency was achieved using ties and hip positioning board set to maintain a true lateral position during surgery. Fluroscopy was done to further confirm the correct positioning of the hip. The surgery was performed by certified BlueSAO THR surgeon.

The hip was prepared in craniolateral approach using aseptic technique. The skin was draped by using sterile THR standard surgical pack with 3M Ioban® iodine impregnated stick film. The deep gluteal region was incised length of 5 cm from cranio-lateral incision with 1 cm cranial to greather throcanter as landmark, the femoral head and acetabulum were exposed and inspected. Tremendous thinning and cartilage loss of the femoral head was observed intraoperatively (figure 2,a&b). The presence of soft tissue swelling and loose torn tissue, severe osteophytes engulfing the acetabulum with very thick coxofemoral joint capsule makes it difficult to distinguish the acetabulum fossa (figure 2 c). Cleaning the surrounding of the acetabulum cranial pole and the caudal pole was done to identify the landmark for acetabulum reaming. Surgical preoperative planning using computer software Vpop Pro®, the cementless femoral stem was deemed most suitable was selected aligned and the components of the femoral implants with the femoral head, neck and preferred acetabulum cup size. The femoral head and neck were excised by making two osteotomies at a 120° angle with the aid of a femoral cutting guide [4]. The femur was then distracted from the acetabular view. To help overcome significant soft tissue tension, the tip of a narrow Hohmann retractor was placed under the ventral aspect of the ischium immediately caudal to the acetabulum and used as a lever against the femoral neck [24].

An acetabular cup of a suitable size was selected based on the measurements obtained from the pre-operative radiographs software planning guide. The reaming starting from the smallest acetabular reamer was used to initiate acetabular reaming formation, and reaming was performed to within 1 mm of the medial aspect of the acetabulum fossa using progressively larger reamers. The depth was confirmed using an acetabular trial cup inserted through the acetabular center. Soft tissue were cleared of and the edges of the reamed acetabulum that could interfere with screw cup engagement. The press fit cup was inserted using cup impacter until fully seated at an angle of 45° to the pelvic alignment. Once again, the cup angle of lateral opening (ALO) was confirmed by using fluroscopy. The femoral medullary canal was prepared to accept the stems using appropriately sized femoral broach. After progressive broaching, the trial stem exhibited a good fit. The selected size 7 femoral stem was inserted into neutral anteversion. An attempt was made to maintain the femoral stem in the most ventral position without compromising the bone stock to counter the natural tendency of the gluteal muscles to pull the femur into a craniodorsal position during the formation of the femoral stem. A 1.5 mm kishner wire was inserted at the retrograde direction thru the stem lateral canal for the guide of insertion of the lateral bolt to prevent subsidence of the stem. Trial heads of selected sizes were used to verify the head size suitable for the femoral stem. Subsequently, the 20 mm PEEK femoral head implant and +3 length neck was slid onto the femoral stem, and the hip was reduced. Hip manipulation was performed through all ranges to assess luxation and impingement. All implant interfaces were evaluated for the detection of soft tissue impingement. A routine closure of the deep gluteal muscles, skin, and subcutaneous layers. The skin incision was later covered by 10 cm × 15 cm Molnlycke® Mepilex Border Post-Op to further protect the incision wound from contamination. The dog was placed in a soft bedded kennel for recovery.

Pethidine (5 mg/kg, intramuscular) was administered every 8 h for 24 h postoperatively. In addition, galliprant (2 mg/kg orally) and cefuroxime (20 mg/kg, intramuscular) were administered intramuscularly. The dog was discharged the next 5 day. Strict cage rest was prescribed for 6–8 weeks. Cephalexin (20 mg/kg orally), gabapentin (15 mg/kg orally), were administered for 5 days twice per day and galliprant (2 mg/kg orally) was administered for 1 week once per day. The dog was able to stand unassisted after 2nd day postoperatively. Long walking was not encouraged during the first 4 postoperative weeks. A gradual increase in assisted standing was recommended after this interval. A follow-up orthopedic examination at 2 weeks postoperatively revealed that the discomfort during hip manipulation had resolved almost completely. The interval of 4 weeks, 2 month and 6 month follow-up orthopedic examination and radiographic evaluation. No minor or major complications were observed during the mid-term clinical and radiographic evaluations.

The radiographic was performed of 12 weeks and 20 weeks postoperatively. Radiographs of the hip joint acquired 12 weeks and 20 weeks postoperatively revealed no evidence of loosening or changes in implant position, absence of implant-bone interface radiolucency, and no femoral stem subsidence (Figure 4a). Long-term follow-up radiographs were available, 10 month post-operatively(Figure 4a,b,c,d). However, the clinical outcomes were assessed as very good by the owner 12 months after THR. The quality of life of the dog had significantly improved after THR surgery assessed by the owner of his dog’s mobility and agility.

3. Research Results and Discussion

Luxation of the hip is the most common joint luxation in dogs [18]. Treatment options are based on closed reduction [1], or surgical reduction and stabilisation using intra-articular or extra-articular methods. Luxation of the hip in dogs were also treated by femoral head osteotomy and neck osteotomy or THR [2,5]. Conversely, in dogs with chronic luxation, hip dysplasia, osteoarthritis, or irreparable articular fractures, open reduction and stabilization of the joint is not indicated [7]. To the authors’ knowledge, this report describe the success treatment of degenerative joint disease (djd) in a dogs in Malaysia undergoing THR using BlueSAO Bionic Hip System. Muscle contracture and periarticular fibrosis resulting from chronic hip luxation usually make the insertion of a femoral prosthesis into the acetabular cup challenging [11]. In this case presented here, the femoral head luxated more dorsally than cranially (Figure 2a). Consequently, the hip luxation was not obvious (Figure 2b) on the ventrodorsal radiograph in other case encountered. Careful scrutiny of orthogonal radiographic projections can help identify a pattern of change, in particular concentric dorsal heterotopic ossification around a luxated femoral head, that can help discriminate between the pseudoacetabulum case and the more classic dysplastic/osteoarthritic joint or the luxoid case [7]. Failure to recognize the presence of a pseudoacetabulum may result in placement of the acetabular component at this ersatz location. Placement of the acetabular prosthesis at the level of the pseudoacetabulum in man has been associated with higher rates of complications, in particular aseptic acetabular cup loosening, compared with placement at the true acetabulum (Linde & Jensen, 1988). Interestingly, in the data reported, aseptic loosening was reported with cementless prostheses only (BioMedtrix BFX cup/stem, Helica) [8].

An open-source three-dimensional segmentation software program can be used to create digital bone models from the CT DICOM (Digital Imaging and Communication in Medicine) Images [25]. We stipulate that CT data, when available, were very helpful in delineating the position and morphology of pseudoacetabulum; this should be considered in similar cases, especially when the radiographic findings are ambiguous. One of the major and potentially devastating complications reported with cementless THR are intra- and postoperative periprosthetic femoral fractures, with reported incidences of 1.5% intraoperatively and 3.6%–13.1% postoperatively in dogs [6,13]. Fractures usually necessitate additional or revision surgery which can be complicated by limited proximal bone stock [20]. Identified risk factors for canine patients include age, a lower canal flare index (CFI), intraoperative fissures during femoral reaming, and osteopathy [6,17]. In humans, additional risk factors include osteoporosis [23]. Dogs had lower femoral cortical index (CTI) values compared to the general study population. The fact that none of these dog developed a postoperative fracture may suggest an indication for additional stabilization in dogs with a lower (CTI) [20]. Although a CT scan of the femur could provide more precise measurements of the CTI, performing CT scans on every dog undergoing THR is not feasible in clinical practice due to the associated costs. Prophylactic plating provides greater mechanical stability and may reduce fracture risk, but it is important to consider the potential for other complications, including implant irritation, infection, increased surgical time, and cost. Future studies should evaluate the long-term benefits and risks of this technique.

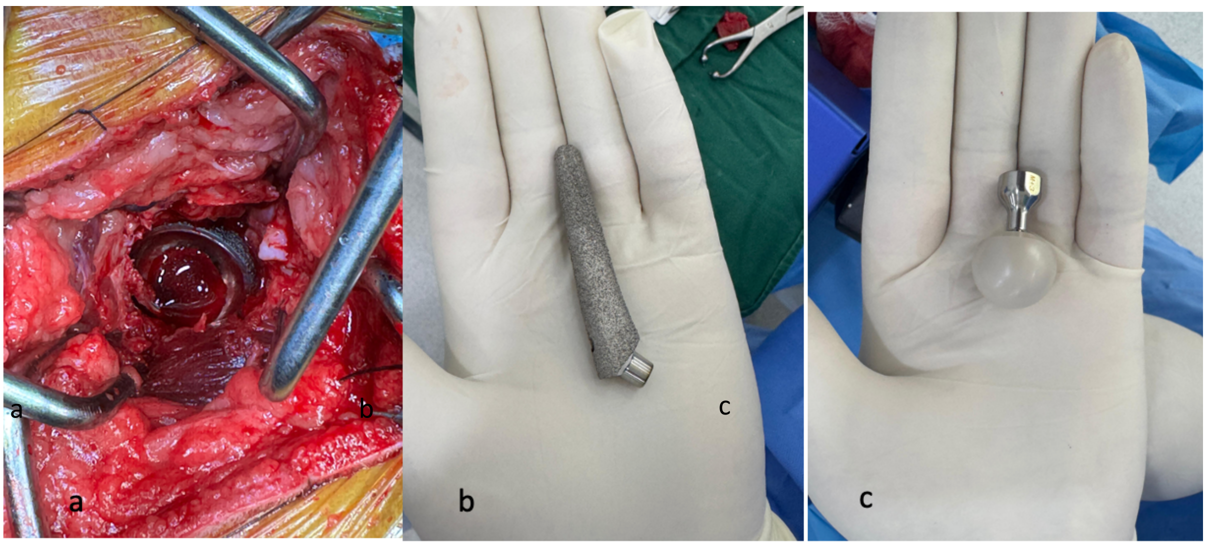

Fig. 3a. acetabulum cup impacted, **3b.** size 7 femoral stem, 3c. Neck +3 and size 20mm PEEK femoral head

Subjectively, acetabular preparation was the greatest contributor to increased duration of surgery. The appropriate exposure to the true acetabulum was found to be a significant challenging because of the chronic cranial and dorsal displacement of the femoral head and the associated periarticular fibrosis and muscle shortening, caudal and distal retraction of the femur. Furthermore, working around the cranial border of the cranially displaced femur to enable appropriate acetabular bed preparation and ultimately cup placement was another challenge that likely had a large influence on the increased operative times [11]. The use of the standard cup impactor to introduce the cup in some dogs due to the acetabular bed is more cranially located femur position. In such circumstances, the cups were placed by hand and then impacted incrementally by using the standard impactor and mallet until the cup was adequately fitted and stable (figure 3a).

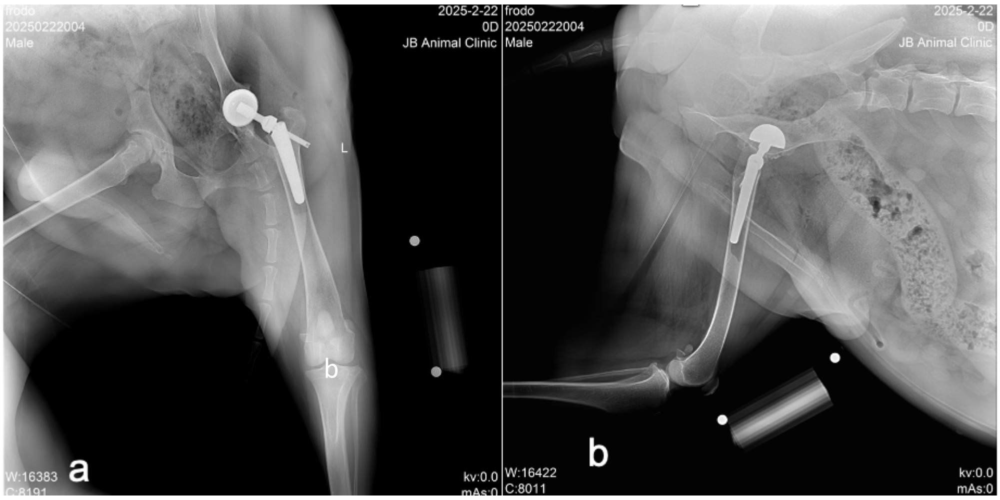

Fig. 4a. Ventral dorsal of the femur, **4b.** True lateral projection of femur

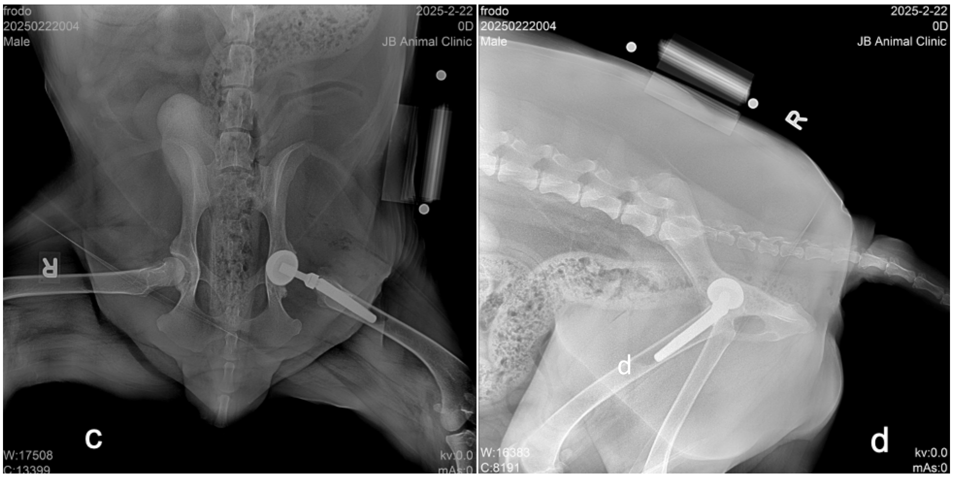

Fig. 4c. Ventral dorsal radiograph, **4d**. Lateral superimpose radiograph of the hip

An additional challenging point that contributed to increased operative and anesthesia time is the reduction of the femoral component into the acetabular prosthesis. Strategies such as placing the acetabular cup more dorsally or medially, creating a more distal femoral osteotomy, and/or distalization of the femoral component can be employed to assist in overcoming tension and thus facilitating reduction of the prosthesis. The THR in dogs with a pseudoacetabulum presents a level of difficulty far above that of a dog with standard hip dysplasia, and this should be borne in mind by the surgeon before undertaking such cases.

The most important limitations of this study were the small sample size and short mid-term radiographic follow-up. The reported follow-up period was insufficient to identify potential long-term complications. Future prospective studies with longer follow-up periods would enable the evaluation of potential late complications, such as aseptic loosening, periprosthetic femoral fractures, or implant failure. Furthermore, this case report was also unable to standardize the perioperative protocol for the BlueSAO Bionic Hip system. The current study also had a number of limitations. Because of the retrospective nature of the study, there was variability in the implants used. The dog were implanted with BlueSAO Bionic Hip implants; however, newer modified versions of the BlueSAO Bionic stems were used in this case, including the use of a new design stem with lateral locking bolt, designed to help prevent stem subsidence. The scrutiny of orthogonal pelvic radiographs is required to discern a repeatable pattern of ilial new bone formation and remodeling around the luxated femoral head in dogs with a pseudoacetabulum. Performance of THR in dogs with a pseudoacetabulum presented a relatively high degree of surgical difficulty, resulting in longer surgery and anesthesia times compared with THR in dogs with simple hip dysplasia and osteoarthritis.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical approval was not required for the studies involving animals in accordance with the local legislation and institutional requirements because ethical review and approval were not required for the animal because this is a case report of examinations and surgery performed for the purpose of patient treatment, and no action contrary to treatment was performed. Written informed consent was obtained from the owners for the participation of their animals in this study.

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References

[1] Beale, B. S., D. D. Lewis, R. B. Parker, G. C. Macpherson, and C. A. Kuntz. "Ischio-ilial pinning for stabilization of coxofemoral luxations in twenty-one dogs: a retrospective evaluation." *Veterinary and Comparative Orthopaedics and Traumatology* 4, no. 01 (1991): 28-34..

[2] Berzon, J. L., P. E. Howard, S. J. Covell, E. J. Trotter, and R. Dueland. "A retrospective study of the efficacy of femoral head and neck excisions in 94 dogs and cats." *Veterinary Surgery* 9, no. 3 (1980): 88-92. https://doi.org/10.1111/j.1532-950X.1980.tb01661.x

[3] Budsberg, Steven C., Jonathan N. Chambers, Stephen L. Van Lue, Tim L. Foutz, and Lynn Reece. "Prospective evaluation of ground reaction forces in dogs undergoing unilateral total hip replacement." *American Journal of Veterinary Research* 57, no. 12 (1996): 1781-1785. https://doi.org/10.2460/ajvr.1996.57.12.1781

[4] DeYOUNG, DAVID J., BONNIE A. DeYOUNG, HAROLD A. ABERMAN, ROBERT V. KENNA, and DAVID S. HUNGERFORD. "Implantation of an uncemented total hip prosthesis technique and initial results of 100 arthroplasties." *Veterinary Surgery* 21, no. 3 (1992): 168-177. https://doi.org/10.1111/j.1532-950X.1992.tb00041.x

[5] Fox, S. M. (1991). Coxofemoral luxations in dogs. Compendium on Continuing Education for the Practicing Veterinarian, 13, 381–388.

[6] Ganz, Seth Mathus, Joshua Jackson, and Bruce VanEnkevort. "Risk factors for femoral fracture after canine press-fit cementless total hip arthroplasty." *Veterinary Surgery* 39, no. 6 (2010): 688-695. https://doi.org/10.1111/j.1532-950X.2010.00694.x

[7] Hayes, Graham M., Juan Ramirez, and Sorrel J. Langley Hobbs. "Does the degree of preoperative subluxation or soft tissue tension affect the incidence of postoperative luxation in dogs after total hip replacement?." *Veterinary Surgery* 40, no. 1 (2011): 6-13. https://doi.org/10.1111/j.1532-950X.2010.00754.x

[8] Henderson, Elisabeth R., Andrew Wills, Andrew M. Torrington, Andy P. Moores, David Thomson, Gareth Arthurs, Gordon Brown et al. "Evaluation of variables influencing success and complication rates in canine total hip replacement: results from the British Veterinary Orthopaedic Association Canine Hip Registry (collation of data: 2010–2012)." *Veterinary Record* 181, no. 1 (2017): 18-18. https://doi.org/10.1136/vr.104036

[9] Hummel, D. W., O. I. Lanz, and S. R. Werre. "Complications of cementless total hip replacement." *Veterinary and Comparative Orthopaedics and Traumatology* 23, no. 06 (2010): 424-432. https://doi.org/10.3415/VCOT-09-07-0071

[10] Jankovits, Daniel A., William D. Liska, and Russell H. Kalis. "Treatment of avascular necrosis of the femoral head in small dogs with micro total hip replacement." *Veterinary Surgery* 41, no. 1 (2012): 143-147. https://doi.org/10.1111/j.1532-950X.2011.00925.x

[11] Jones, Stephen C., Edyta Bula, and Jonathan Dyce. "Total hip arthroplasty to address chronic hip luxation with pseudoacetabulum formation in seven dogs." *Veterinary Surgery* 48, no. 8 (2019): 1530-1539. https://doi.org/10.1111/vsu.13317

[12] Kalis, Russell H., William D. Liska, and Daniel A. Jankovits. "Total hip replacement as a treatment option for capital physeal fractures in dogs and cats." *Veterinary Surgery* 41, no. 1 (2012): 148-155. https://doi.org/10.1111/j.1532-950X.2011.00919.x

[13] Kidd, Scott W., Christopher A. Preston, and George E. Moore. "Complications of porous-coated press-fit cementless total hip replacement in dogs." *Veterinary and Comparative Orthopaedics and Traumatology* 29, no. 05 (2016): 402-408. https://doi.org/10.3415/VCOT-15-07-0116

[14] Kwok, Jenny Y., and Kirk L. Wendelburg. "Clinical outcomes of canine total hip replacement utilizing a BFX lateral bolt femoral stem: 195 consecutive cases (2013–2019)." *Veterinary Surgery* 52, no. 1 (2023): 51-61. https://doi.org/10.1111/vsu.13871

[15] Lascelles, B. Duncan X., M. I. L. A. Freire, Simon C. Roe, V. E. N. I. T. A. DePUY, Eric Smith, and DENIS J. MARCELLIN-LITTLE. "Evaluation of functional outcome after BFX® total hip replacement using a pressure sensitive walkway." *Veterinary Surgery* 39, no. 1 (2010): 71-77. https://doi.org/10.1111/j.1532-950X.2009.00607.x

[16] Linde, Frank, and Jørn Jensen. "Socket loosening in arthroplasty for congenital dislocation of the hip." *Acta Orthopaedica Scandinavica* 59, no. 3 (1988): 254-257. https://doi.org/10.3109/17453678809149356

[17] Liska, William D. "Femur fractures associated with canine total hip replacement." *Veterinary Surgery* 33, no. 2 (2004): 164-172. https://doi.org/10.1111/j.1532-950X.2004.04024.x

[18] McLaughlin, Ronald M. "Traumatic joint luxations in small animals." *Veterinary Clinics: Small Animal Practice* 25, no. 5 (1995): 1175-1196.. https://doi.org/10.1016/s0195-5616(95)50110-x

[19] Mitchell, Megan M., Caleb C. Hudson, and Brian S. Beale. "Comparison of femoral stem subsidence between three types of press-fit cementless total hip replacement in dogs." *Veterinary Surgery* 49, no. 4 (2020): 787-793.· https://doi.org/10.1111/vsu.13391

[20] Monotti, Isobel C., Christopher A. Preston, and Scott W. Kidd. "Treatment outcomes for periprosthetic femoral fractures in cementless press-fit total hip replacement." *Veterinary and Comparative Orthopaedics and Traumatology* 33, no. 05 (2020): 370-376. https://doi.org/10.1055/s-0040-1709486

[21] Roush, J. K. "Surgical therapy of canine hip dysplasia." *Veterinary surgery small animal* 1 (2012): 849-64.

[22] Ruxton, Carrie. "Tea: Hydration and other health benefits." *Primary Health Care* 26, no. 8 (2016). https://doi.org/10.7748/phc.2016.e1162

[23] Wang, Zhaorui, Teerapat Tutaworn, Mark D. Wishman, Justin E. Levin, Isabelle G. Hentschel, and Joseph M. Lane. "Fracture risk assessment tool scores and radiographical bone measurements in total hip arthroplasty patients." *The Journal of Arthroplasty* 37, no. 12 (2022): 2381-2386. https://doi.org/10.1016/j.arth.2022.06.015

[24] Wood, I., H. Powell, A. Kohm, J. J. Lannutti, and J. Dyce. "Evaluation of femoral head damage during canine total hip replacement." *Veterinary and Comparative Orthopaedics and Traumatology* 16, no. 03 (2003): 184-190. https://doi.org/10.1055/s-0038-1632775

[25] Yushkevich, Paul A., Joseph Piven, Heather Cody Hazlett, Rachel Gimpel Smith, Sean Ho, James C. Gee, and Guido Gerig. "User-guided 3D active contour segmentation of anatomical structures: significantly improved efficiency and reliability." *Neuroimage* 31, no. 3 (2006): 1116-1128. https://doi.org/10.1016/j.neuroimage.2006.01.015