

Prospects and Constraints of Canine Total Hip Replacement (THR) in India

Rohit Kumar, K S Kamalesh Kumar, T Sai Kumar, A C Saxena, Abhijit Pawde and Amarpal

Division of Surgery, Indian Veterinary Research Institute, Izzatnagar, Bareilly, Uttar Pradesh, India.

[DOI:10.5281/Vettoday.13337262](https://doi.org/10.5281/Vettoday.13337262)

Abstract: *Canine Total Hip Replacement (THR) is a crucial surgical intervention for dogs with severe hip conditions like dysplasia and osteoarthritis. While THR is well-established in Western countries, India faces unique challenges in adopting this procedure. These include high costs due to importing implants, a limited number of trained surgeons, and the lack of breed-specific implants suited to India's diverse canine population. Additionally, the absence of comprehensive morphometric studies on Indian breeds hampers the procedure's success. Despite the rapid growth of the Indian pet care market, driven by rising pet ownership and increased disposable income, the high cost of THR—ranging from INR 1.5 lakh to INR 3 lakh (USD 2,000 to USD 4,000)—restricts access to this advanced treatment. Cultural attitudes and economic disparities further confine THR to urban and affluent areas, leaving rural regions underserved. This article explores the prospects and constraints of canine THR in India, suggesting solutions like local manufacturing of implants, expanding veterinary training, and improving post-operative care. Addressing these challenges, along with conducting breed-specific morphometric studies, is essential for making THR more accessible and effective, ultimately enhancing the quality of life for dogs across India.*

Keywords: Canine THR, Indian Scenario, Future directions, Pitfalls in India

Introduction

Canine Total Hip Replacement (THR) is an advanced surgical intervention to alleviate complete

pain and restore 100% joint mobility. THR is aimed at alleviating severe congenital and acquired hip joint affections in dogs, such as chronic hip dysplasia, osteoarthritis, and trauma-related damages. It involves replacing the damaged joint with a prosthetic implant, thereby restoring mobility and significantly improving the quality of life for the affected dogs. Since its inception in the 1970s, the procedure has been recognized as a gold standard in veterinary orthopedics, especially in Western countries where it is widely practiced. However, the adoption of THR in India is still in its nascent stages, facing unique challenges that range from economic constraints to a lack of specialized training among veterinarians.

Globally, the development of canine THR has seen substantial progress over the last few decades. The procedure has evolved from the initial cemented prosthesis models to more advanced cementless designs, which offer improved longevity and adaptability to various patient needs. Innovations such as the BioMedtrix BFX and CFX systems have played a crucial role in enhancing the outcomes of THR by offering options tailored to specific anatomical and biomechanical requirements. Despite these advancements, the implementation of such technologies in India is hampered by several factors including the high cost of importing these implants, limited availability of breed-specific implants, and a lack of comprehensive morphometric studies that are essential for customizing implants to the Indian canine population.

Historical Background of Canine THR

The pioneering work of Dr. John Charnley in 1961, who used acrylic cement for the first hip arthroplasty, is often credited with revolutionizing joint replacement. The insights gained from human Total Joint Replacement (TJR) have facilitated advancements designed to meet the unique needs of our companion animals. A successful report of a fixed-head THR prosthesis (Richard's Canine II Hip Prosthesis, Richards Medical, Memphis, Tennessee) implantation in the dog by Hoefle established THR as a potential treatment option for veterinary patients. This first successful canine THR was performed in the 1970s, marking a significant milestone in veterinary medicine. Since then, the procedure has undergone continuous refinements, leading to the development of both cemented and cementless THR systems. Cemented THR, which involves fixing the implant with bone cement, was the standard technique initially. However, concerns over the longevity of cemented implants led to the development of cementless THR systems, which rely on biological fixation as the bone grows into the porous surface of the implant. These systems have become increasingly popular due to their potential for longer-lasting outcomes and fewer post-operative complications.

In India, the adoption of THR has been slow but steady. The first documented cases of THR in India were performed in the early 2000s, and since then, there has been a gradual increase in the number of veterinary surgeons trained in this complex procedure. However, the procedure remains relatively rare due to the high cost, lack of awareness among pet owners, and limited availability of implants and access to specialized training and equipment.

Global Development of Canine THR

Total hip replacement (THR) has historically been the most common joint arthroplasty performed in small animals, reflecting the significant advances in this area. Globally, canine THR has seen significant advancements, particularly in the development of more sophisticated implant designs and surgical techniques. In Western countries, both cemented and cementless THR procedures are routinely performed, with high success rates reported. The

introduction of cementless systems, such as the PCA Canine Total Hip System (Biomedtrix,) and the KYON total hip replacement system (Kyon, Zurich, Switzerland), has been a game-changer, offering superior outcomes in terms of implant longevity and post-operative recovery. In Europe and North America, THR is considered the treatment of choice for osteoarthritis, severe hip dysplasia and other debilitating hip conditions in dogs. The more precise instrumentation has offered a success rate more than 85 to 95% in clinical cases. The evolution from cemented systems with improved component design and 3rd generation cementing techniques to cementless systems marks a significant development. The third generations cement preparation techniques that minimizes air bubbles and cracks in the cement mantle also have improved the bonding at the cement metal and cement bone interface by avoiding voids during polymerisation. Non-cemented or cementless systems have been found to have exceptional results in the long term due to the porous ingrowth of bone on the metallic and porous surfaces. It also proved to provide short-term stability by immediate press-fit into the prepared bone, thereby creating an arguably superior and excellent biologic fixation system for young and different active dog breeds. A short-term success rate of 98% and a long-term success rate of 87% has been reported in porous-coated canine THR implants. A more stable mechanical interlock system has also been incorporated to provide immediate stability by companies like KYON using monocortical screws to lock the femoral component into the medial cortex. Cementless systems offer surgeons and clients diverse options for technique optimization, which can be tailored according to the patient's size, age, intended function, anatomical structure, disease state, and the surgeon's preferences. Clinical research is currently shaping the indications for choosing between cemented, cementless, or hybrid implants, with preliminary reports suggesting that success rates may be enhanced through proper selection. Miniature total hip replacement systems have also emerged, although clinical evidence on their indications and success rates is still pending.

In contrast, the adoption of THR in India faces several constraints. One of the major challenges is the high cost of importing these advanced implants,

which significantly increases the overall cost of the procedure. Additionally, there is a lack of breed-specific implants in the Indian market, which is critical given the diverse range of dog breeds in the country. This is compounded by the absence of comprehensive morphometric studies that are necessary to develop implants suited to the specific anatomical characteristics of Indian dogs. Moreover, the lack of specialized training in veterinary orthopedics further limits the widespread adoption of THR in India.

Globally Emerging Innovations in Small Animal Arthroplasty

The field of small animal orthopedics is witnessing a paradigm shift with the incorporation of cutting-edge technologies. *3D printing* and *custom prosthetics* are particularly noteworthy, allowing for the production of implants tailored to the individual anatomical requirements of patients. This not only ensures a better fit and functionality of the prostheses but also reduces surgical duration and enhances postoperative outcomes. Advancements in *biomaterials*, such as *bioceramics* and *bioactive glass*, are further contributing to this progress by promoting osseointegration and minimizing implant-related complications. These technological innovations represent a move toward more personalized and effective treatments, potentially improving the long-term success rates of joint arthroplasties in small animals.

Prospects of Canine THR in India

- **Rising Pet Ownership and Expenditure on Pet Healthcare**

The Indian pet care industry has seen rapid growth, driven by increasing pet ownership, especially in urban areas. The market, valued at over USD 1 billion in 2021, is projected to continue its growth, with a compound annual growth rate (CAGR) of 13.9% from 2022 to 2030. This trend indicates a growing willingness among pet owners to invest in advanced healthcare options, including THR, for their pets.

- **Growing Awareness and Demand for Advanced Veterinary Care**

As the middle class in India expands, there is a corresponding increase in awareness and

demand for advanced veterinary care. Pet owners are becoming more informed about the options available for treating conditions like hip dysplasia, leading to a rise in inquiries about THR. This growing demand is being met by an increasing number of veterinary clinics offering specialized services, although the availability of THR remains limited to a few centers.

- **Advances in Veterinary Education and Training**

Veterinary education in India has improved significantly, with more institutions offering specialized training in orthopedic surgery. Collaborative efforts with international veterinary schools and professionals have enabled Indian veterinarians to gain exposure to the latest surgical techniques and technologies. However, the availability of hands-on training in procedures like THR is still limited, and there is a need for more widespread and accessible training programs to build expertise in this area.

- **Availability of Modern Implants and Surgical Tools**

The availability of high-quality implants and surgical tools in India has improved, with companies like BioMedtrix supplying advanced THR systems to the market. However, the high cost of importing these implants remains a significant barrier to widespread adoption. Additionally, there is a lack of breed-specific implants, which is a critical issue given the diverse range of dog breeds in India. This underscores the need for more research and development in the area of morphometric studies to develop implants suited to the Indian canine population. More recently, the Indian Veterinary Research Institute has contributed for development of cemented THR implants for medium and large breed dogs which is based on the morphometric evaluation of the Labrador and German shepherd breed dogs.

- **Economic Growth and Increasing Disposable Income**

India's economic growth has led to an increase in disposable income among the middle and upper classes, who are more

likely to invest in premium veterinary care. This economic shift is enabling more pet owners to afford procedures like THR, which were previously considered out of reach for many. However, the high cost of the procedure still limits its accessibility to a relatively small segment of the population.

Constraints of Canine THR in India

- **High Costs and Affordability Issues**

The cost of THR, which can range from INR 1.5 lakh to INR 3 lakh (approximately USD 2,000 to USD 4,000), remains a significant barrier to its adoption in India. The high cost is largely due to the expense of importing advanced implants and the specialized nature of the surgery, which requires skilled surgeons and high-quality post-operative care. This makes the procedure unaffordable for a large portion of the population, particularly in rural and semi-urban areas.

- **Limited Number of Skilled Surgeons**

The success of THR is heavily dependent on the expertise of the surgeon. In India, there is a relatively small number of veterinarians who are trained and experienced in performing this complex procedure. This scarcity of skilled surgeons limits the availability of THR to a few specialized centers, primarily in urban areas, making it inaccessible to many pet owners across the country. The lack of training causes lesser success rate in the postoperative period.

- **Post-Operative Care and Rehabilitation Challenges**

Effective post-operative care and rehabilitation are essential for a successful recovery and enhanced joint function following total hip replacement (THR). In India, the availability of specialized rehabilitation services is limited, which can jeopardize the long-term success of the surgery. Moreover, many pet owners may not have the resources or knowledge to provide the necessary aftercare at home, leading to suboptimal outcomes and an increased risk of complications such as infection, implant failure, or dislocation.

- **Cultural and Socioeconomic Barriers**

Cultural attitudes towards pet healthcare vary widely across India. In many parts of the country, spending large sums of money on a pet's surgery is still seen as unnecessary or even wasteful. This perception, coupled with socioeconomic disparities, means that the demand for advanced procedures like THR is largely confined to urban, affluent populations. In rural areas, where a significant portion of the population lives, access to even basic veterinary care is limited, let alone specialized surgeries like THR.

- **Regulatory and Supply Chain Challenges**

The veterinary sector in India faces several regulatory and supply chain challenges that hinder the widespread adoption of THR. The import of high-quality implants and advanced surgical tools is often delayed by regulatory bottlenecks, which increases costs and limits availability. Additionally, the distribution of these materials is often concentrated in major cities, making it difficult for veterinarians in smaller towns or rural areas to access the necessary resources for performing THR.

Future Directions

- **Improving Affordability through Local Manufacturing**

One potential solution to the cost barrier is the local manufacturing of THR implants. By producing high-quality implants domestically, costs could be reduced, making the procedure more affordable for a broader segment of the population. Encouraging public-private partnerships in this area could also foster innovation and cost-effectiveness in veterinary care.

- **Expanding Veterinary Training Programs**

Expanding training programs for veterinary surgeons, with a focus on orthopedic specialties, could increase the number of professionals capable of performing THR. Collaborations with international veterinary schools and continued professional development opportunities are essential to keep up with global standards.

- **Enhancing Post-Operative Care Facilities**

Establishing more specialized post-operative care centers, particularly in major urban areas, would help improve the outcomes of THR surgeries. These centers could offer comprehensive rehabilitation services, ensuring that pets receive the care they need to recover fully.

- **Promoting Awareness and Acceptance**

Efforts to educate the public about the benefits of advanced veterinary care, including THR, could help change cultural perceptions and increase acceptance of these procedures. Outreach programs, social media campaigns, and collaborations with pet care brands could play a significant role in this regard.

- **Strengthening Regulatory Frameworks**

Streamlining regulatory processes for the import and distribution of veterinary implants and tools would help alleviate some of the supply chain challenges. Additionally, establishing clear guidelines and standards for THR procedures could help ensure consistency in the quality of care provided across the country.

Conclusion

Canine Total Hip Replacement (THR) in India holds significant promise for improving the quality of life for dogs suffering from severe hip conditions. However, realizing this potential requires addressing several constraints, particularly related to cost, expertise, and post-operative care. By focusing on strategies to improve affordability, expand training, enhance care facilities, and strengthen regulatory frameworks, THR could become a more accessible and successful option in India's veterinary landscape.

References

- Allen, M. J. (2012). Advances in total joint replacement in small animals. *Journal of Small Animal Practice*, 53(9): 495-506.
- Arunprasad, A. A., Shafiuzama, M. S., Ayyappan, R., Sureshkumar, & Jayaprakash, R. (2012). Incidence of coxofemoral joint affections in dogs - A clinical study of 575 patients. *Intas Polivet*, 13(II): 281-283.

- Conzemius, M. G. & Vandervoort, J. (2005). Total joint replacement in the dog. *Veterinary Clinics Small Animal Practice*, 35(5):1213-1231.
- Cook, J. L. (2007). Future trends in joint replacement and tissue engineering in small animal orthopedics. *Veterinary Surgery*, 36(4): 287-288.
- Hummel, D. (2017). Zurich cementless total hip replacement. *Veterinary Clinics of North America: Small Animal Practice*, 47(4): 917-934.
- Jackson, J. (2011). Father of the modern hip replacement. *Journal of Medical Biography*, 19(4): 151-156.
- Olmstead, M. L., Hohn, R. B., & Turner, T. M. (1983). A five-year study of 221 total hip replacements in the dog. *Journal of the American Veterinary Medical Association*, 183(2): 191-194.
- Peck, J. N., & Marcellin-Little, D. J. (Eds.). (2013). *Advances in Small Animal Total Joint Replacement*. John Wiley & Sons.
- Schiller, T. D. (2017). BioMedtrix total hip replacement systems: An overview. *Veterinary Clinics of North America: Small Animal Practice*, 47(4): 899-916.
- Schulz, K. S. (2000). Application of arthroplasty principles to canine cemented total hip replacement. *Veterinary Surgery*, 29(6): 578-593.
- Singh S. & Kumar R. (2023). Comparative evaluation of radiographic morphometry of femur and hip joint in healthy Labrador Retriever and German Shepherd breeds of dog. *The Pharma Innovation Journal* 12(11): 241-245.