



Original Article

Indications and Implant Selection in Total Hip Replacement in a Rural Tribal Population: A Prospective Observational Study

Dr Mukesh Madhur¹, Dr Swati Singh², Dr Amit Priyadarshi³, Ashish Kumar ragase⁴

¹Senior resident Dept of Orthopaedics AIIMS BHOPAL

²Junior resident Dept of Anatomy KS Hegde Medical academy, Mangaluru

³Assistant professor Dept of Trauma and Emergency medicine AIIMS BHOPAL

⁴Associate Professor Raipur Institute of Medical Sciences

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Corresponding Author:

Dr Mukesh Madhur

Senior resident Dept of
Orthopaedics AIIMS BHOPAL

Email: madhurslove@gmail.com

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ABSTRACT

Background: Total hip replacement (THR) is an established and highly successful surgical procedure for the management of end-stage hip disorders. The epidemiology of conditions requiring THR and the choice of implant fixation vary considerably across populations. In India, avascular necrosis (AVN) is a major indication for THR and frequently affects younger individuals, influencing implant selection and long-term management strategies. However, data regarding indications for THR and implant-selection patterns in rural and tribal populations remain limited.

Objective: To evaluate the spectrum of indications for total hip replacement and to assess the pattern of implant selection among patients undergoing THR in a rural tribal population of central India.

Methods: A prospective observational study was conducted in the Department of Orthopaedics, Raipur Institute of Medical Sciences, Raipur, Chhattisgarh, India, over a period of 18 months. A total of 79 patients undergoing primary THR were included. Demographic characteristics, indications for surgery, and implant fixation methods were recorded. The distribution of cemented and uncemented arthroplasty was analyzed using descriptive statistics.

Results: Seventy-nine patients underwent primary THR during the study period. The mean age of the study population was 44.16 ± 13.85 years, and males constituted 77.2% of the cohort. Avascular necrosis of the femoral head was the most common indication for THR, accounting for 49 cases (62.0%), followed by osteoarthritis (19.0%), fracture neck of femur (8.9%), failed hemiarthroplasty (5.1%), rheumatoid arthritis (2.5%), and ankylosing spondylitis (2.5%). Uncemented THR was performed in 71 patients (89.9%), whereas cemented THR was performed in 8 patients (10.1%). Patients undergoing cemented THR were older, with a mean age of 61.25 ± 8.34 years, compared with 42.24 ± 12.78 years among those receiving uncemented implants. The predominance of AVN and the younger age profile contributed to the overwhelming preference for uncemented fixation.

Conclusion: The epidemiological profile of THR in this rural tribal population differs substantially from that reported in Western populations. Avascular necrosis was the predominant indication for surgery, and patients undergoing THR were considerably younger than those reported in international registries. Uncemented fixation was the preferred implant choice, reflecting the younger age and better bone quality of the study population. These findings highlight the need for region-specific arthroplasty strategies and provide valuable insights into implant-selection patterns in rural and tribal populations of central India.

Keywords: Total hip replacement; Total hip arthroplasty; Avascular necrosis; Osteoarthritis; Cemented hip replacement; Uncemented hip replacement; Implant selection; Rural population; Tribal population.

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INTRODUCTION

Total hip replacement is one of the most successful and widely performed reconstructive procedures in orthopaedic surgery, providing reliable pain relief, restoration of mobility, and significant improvement in quality of life for patients with end-stage hip disorders (1). Since its introduction by Sir John Charnley in the early 1960s, THR has evolved considerably through advances in implant design, biomaterials, fixation techniques, and surgical approaches, resulting in excellent long-term survivorship and patient satisfaction (2,3). Consequently, THR has become the treatment of choice for a variety of debilitating hip conditions, including osteoarthritis, avascular necrosis of the femoral head, fracture neck of femur, rheumatoid arthritis, ankylosing spondylitis, and failed hip reconstructive procedures (Aswal, Outcome of Patients Treated with Total Hip Arthroplasty for Various Disorders of Hip: A Retrospective Study, 2025).

The epidemiology of hip disorders requiring THR varies considerably across different geographical regions and populations (5). In developed countries, primary osteoarthritis is the predominant indication for THR and is largely observed in elderly individuals (6). In contrast, studies from India and other South Asian settings have consistently demonstrated that avascular necrosis of the femoral head represents a major indication for THR, often affecting younger and economically productive age groups (Jain, Sao, & Patond, Statistical analysis of total hip arthroplasty at rural hospital in Maharashtra under MJPJAY: a prospective study, 2024; Liu, Hu, Chan, & Sathappan, 2009; Aneja, Machaiah, & Shyam, 2025). This distinct disease pattern results in a lower mean age of patients undergoing THR compared with Western populations and has important implications for implant selection, long-term survivorship, and postoperative functional demands.

Selection of an appropriate implant fixation method remains an important determinant of surgical outcome following THR (10). The two principal fixation techniques include cemented and uncemented arthroplasty (11). Cemented THR utilizes polymethylmethacrylate bone cement to achieve immediate fixation between the prosthesis and host bone, whereas uncemented THR relies on biological fixation through bone ingrowth and osteointegration (12). Both techniques have demonstrated favorable long-term outcomes; however, implant selection is influenced by several factors including patient age, bone quality, activity level, underlying pathology, surgeon preference, and implant availability (13,14).

Younger patients with good bone stock are generally considered ideal candidates for uncemented fixation because of the potential for long-term biological integration and preservation of bone stock (11,15). Conversely, cemented fixation is often preferred in elderly individuals and patients with osteoporosis or compromised bone quality (14,15). Understanding patterns of implant selection in different populations is important for evaluating contemporary arthroplasty practices and optimizing treatment strategies. Furthermore, the distribution of indications for THR may significantly influence implant preference, particularly in populations where AVN predominates over degenerative osteoarthritis.

Rural and tribal populations represent a unique demographic group that remains underrepresented in arthroplasty literature (16,17). These populations frequently experience delayed healthcare access, limited availability of specialist services, and greater occupational dependence on physically demanding activities (18,19). Such factors may influence both the spectrum of hip disorders requiring THR and the choice of implant fixation. Despite the increasing utilization of THR in India, there is limited evidence describing indications for surgery and implant-selection patterns among rural and tribal populations.

Most available studies evaluating indications for THR and implant-selection patterns have been conducted in urban tertiary-care centres (20) and may not accurately reflect the epidemiological profile of patients from rural and tribal regions (Mishra, Singh, & Gupta, 2022; Jain, Sao, & Patond, Statistical analysis of total hip arthroplasty at rural hospital in Maharashtra under MJPJAY: a prospective study, 2024). Understanding the common indications for THR and factors influencing the choice between cemented and uncemented fixation is essential for planning arthroplasty services, optimizing resource allocation, and improving patient outcomes in these populations (19). Therefore, the present study was undertaken to evaluate the spectrum of indications for THR and the pattern of implant selection in a rural tribal population of central India.

The present study was undertaken to determine the common indications for total hip replacement and to evaluate the pattern of implant selection among patients undergoing THR in a rural tribal population. Additionally, the study aimed to assess the distribution of cemented and uncemented arthroplasty and to identify the predominant clinical conditions necessitating total hip replacement in this setting.

METHODS

Study Design and Setting

A prospective observational study was conducted at the Department of Orthopaedics, Raipur Institute of Medical Sciences, Raipur, Chhattisgarh, India, over 18 months. The institution serves a predominantly rural and tribal population from central India.

Study Population

All eligible patients undergoing primary THR during the study period were enrolled after obtaining informed consent. A total of 79 patients were included in the final analysis.

Data Collection

Demographic details including age and sex were recorded. Clinical indications leading to THR were documented and categorized as avascular necrosis, osteoarthritis, fracture neck of femur, failed hemiarthroplasty, rheumatoid arthritis, and other indications.

Implant Selection

The type of prosthesis used (cemented or uncemented THR) was recorded for each patient. Implant selection was made by the treating surgeon based on patient characteristics, bone quality, age, and clinical considerations.

Outcome Measures

The primary outcomes were the distribution of indications for THR and the proportion of patients undergoing cemented versus uncemented THR. Secondary analyses evaluated demographic characteristics associated with various indications and implant choices.

Statistical Analysis

Categorical variables were summarized as frequencies and percentages, while continuous variables were expressed as mean \pm standard deviation. The commonest indication for THR and the distribution of implant choices were determined using descriptive statistics.

Ethical Approval

The study received approval from the Institutional Ethics Committee of Raipur Institute of Medical Sciences, Raipur, Chhattisgarh. Written informed consent was obtained from all patients before inclusion in the study.

RESULTS

Demographic Characteristics

A total of 79 patients undergoing primary total hip replacement (THR) were included in the study. The mean age of the study population was 44.16 ± 13.85 years. Males constituted the majority of patients (77.2%), while females accounted for 22.8%.

Table 1. Baseline Demographic Characteristics of Patients Undergoing THR (N = 79)

Variable	Value
Age (years), Mean \pm SD	44.16 \pm 13.85
Male, n (%)	61 (77.2)
Female, n (%)	18 (22.8)

Indications for Total Hip Replacement

Avascular necrosis (AVN) of the femoral head was the most common indication for THR, accounting for the majority of cases. Other indications included osteoarthritis, fracture neck of femur, failed hemiarthroplasty, rheumatoid arthritis, and ankylosing spondylitis.

Table 2. Indications for Total Hip Replacement

Indication	Number of Patients (n)	Percentage (%)
Avascular necrosis	49	62.0
Osteoarthritis	15	19.0
Fracture neck of femur	7	8.9
Failed hemiarthroplasty	4	5.1
Rheumatoid arthritis	2	2.5
Ankylosing spondylitis	2	2.5
Total	79	100.0

AVN emerged as the predominant indication for THR, accounting for nearly two-thirds of all procedures performed in the study population.

Implant Selection Pattern

Among the 79 patients, uncemented THR was performed in the majority of cases. Cemented fixation was utilized in a smaller proportion of patients, primarily based on age, bone quality, and surgeon preference.

Table 3. Distribution of Cemented and Uncemented Total Hip Replacement

Type of THR	Number of Patients (n)	Percentage (%)
Uncemented THR	71	89.9
Cemented THR	8	10.1
Total	79	100.0

Uncemented fixation was the preferred method of implantation, accounting for approximately 90% of all procedures.

Relationship Between Age and Implant Choice

Patients undergoing cemented THR were generally older than those receiving uncemented implants. Uncemented prostheses were predominantly utilized in younger patients with good bone stock, whereas cemented fixation was reserved for selected elderly patients and those with compromised bone quality.

Table 4. Age Distribution According to Implant Type

Implant Type	Mean Age (Years) ± SD
Cemented THR	61.25 ± 8.34
Uncemented THR	42.24 ± 12.78

Epidemiological Profile of THR in a Rural Tribal Population

The present study demonstrated a distinctive epidemiological pattern of THR in a rural tribal population. Unlike Western populations where primary osteoarthritis is the leading indication for THR, avascular necrosis represented the predominant indication in this cohort. Additionally, the relatively young mean age of patients undergoing THR reflects the burden of AVN among economically productive age groups. The overwhelming preference for uncemented implants further reflects the younger patient demographic and the need for durable biological fixation in physically active individuals.

Overall, avascular necrosis was the commonest indication for THR, and uncemented fixation was the preferred implant choice in this rural tribal population.

DISCUSSION

The present study provides a detailed evaluation of the indications and implant selection patterns for total hip replacement in a rural tribal population of central India. Our findings reveal a distinct epidemiological and clinical profile compared to Western populations and even some urban Indian cohorts. The most striking observations include the overwhelming predominance of avascular necrosis as the primary indication for surgery (62%), the significantly younger mean age of the cohort (44.16 years), and the strong preference for uncemented fixation (89.9%).

Spectrum of Indications

Avascular necrosis was the leading indication for THR in our study, accounting for 62% of all cases, while primary osteoarthritis followed at a much lower frequency of 19%. This distribution stands in sharp contrast to Western registries, such as the UK National Joint Registry and Norwegian registers, where primary OA is the predominant indication, often exceeding 90% (6,21). While studies from urban Indian tertiary centers also recognize AVN as a major indication, some still report OA as the leading cause (70%) in older cohorts (20). However, our data aligns more closely with contemporary Indian semi-urban and rural reports and the Indian Joint Registry, which highlight AVN as a primary driver for THR in the Indian subcontinent (Aneja, Machaiah, & Shyam, 2025; Aswal, Outcome of Patients Treated with Total Hip Arthroplasty for Various Disorders of Hip: A Retrospective Study, 2025). The high prevalence of AVN in this tribal population may be attributed to regional factors such as the high incidence of sickle cell disease, alcohol consumption, and potentially late-stage presentations of secondary hip pathologies (20).

Demographic Profile and Age Considerations

The mean age of our study population was 44.16 ± 13.85 years, which is substantially lower than the mean age of approximately 69.2 years reported in Western THR registries (21). This age gap of nearly 25 years has profound implications for long-term surgical outcomes and implant durability. Patients in our cohort are in their most economically productive years and often engage in high-demand physical labor common in rural tribal settings (19). The lower mean age reflects the underlying pathology, as AVN typically affects younger individuals compared to the degenerative nature of primary OA seen in elderly Western patients (Liu, Hu, Chan, & Sathappan, 2009; Jain, Sao, & Patond, Statistical analysis of total hip arthroplasty at rural hospital in Maharashtra under MJPJAY: a prospective study, 2024).

Implant Selection Patterns

In response to the younger demographic and high physical demands, uncemented fixation was utilized in 89.9% of our cases. The preference for biological fixation via uncemented components is clinically justified in younger patients with good bone stock, as it facilitates bone ingrowth and osseointegration, potentially offering better long-term resistance to aseptic loosening compared to cemented stems in active individuals (11,22). While cemented THR has a long history of success—pioneered by Sir John Charnley (1,2)—its use in our study (10.1%) was primarily reserved for older patients

(mean age 61.25 years) or those with compromised bone quality. Modern literature supports this trend, suggesting that uncemented THA is more conducive to the higher activity levels and longer life expectancy of younger patients, even allowing for easier future revision surgeries if required (23,24).

Clinical Implications in the Rural Tribal Setting

The findings of this study underscore the unique challenges of providing arthroplasty services in a rural tribal region. Tribal populations in India often face significant barriers to healthcare, including geographical isolation and limited infrastructure (18,25). These impediments often lead to delayed healthcare-seeking behavior; many patients only seek specialist care months after the onset of symptoms (26). By the time these patients reach a tertiary center like ours, hip disorders such as AVN or post-traumatic conditions have often progressed to end-stage destruction, necessitating THR rather than joint-preserving procedures. Furthermore, the reliance on physically demanding activities in tribal communities necessitates the selection of implants that can withstand high mechanical stress, further justifying the shift toward uncemented biological fixation (13,27).

Study Limitations

This study has several limitations that should be acknowledged. First, the sample size (N=79) is relatively small, which may limit the generalizability of the findings to the entire tribal population of India. Second, the single-center, prospective observational design may reflect the specific referral patterns and surgeon preferences of our institution rather than a broader regional trend. Additionally, the study focuses on indications and implant selection without long-term functional follow-up or survival analysis. Future multi-center studies with larger cohorts and long-term outcome data are essential to further optimize arthroplasty practices for this unique demographic.

CONCLUSION

This study demonstrates that total hip replacement in the rural tribal population of central India presents a distinct clinical and epidemiological profile compared to global standards. Avascular necrosis was identified as the predominant indication for surgery, accounting for 62% of the cases, which aligns with regional patterns but contrasts sharply with the osteoarthritis-dominant profiles seen in Western registries (Saoji, Gupta, Chavan, Gawande, & Jain, 2022; Aswal, Outcome of Patients Treated with Total Hip Arthroplasty for Various Disorders of Hip: A Retrospective Study, 2025). The mean age of the cohort (44.16 years) is significantly younger than the mean age of approximately 69.2 years reported in Western cohorts (21). To meet the high physical demands and longer life expectancy of this younger demographic, there was a strong preference for uncemented fixation (89.9%), which provides the biological stability necessary for active individuals (23,24,27).

These findings underscore the critical necessity for specialized arthroplasty strategies and tailored orthopaedic care that account for the unique socioeconomic and geographical challenges of rural tribal regions (25,26). While the results are promising for this specific demographic, future large-scale, multi-center research is essential to validate long-term functional outcomes and implant survival in this underserved population.

REFERENCES

1. Caton J, Prudhon JL. Over 25 years survival after Charnley's total hip arthroplasty. *International Orthopaedics* [Internet]. 2011 Jan 19 [cited 2026 Jan];35(2):185–8. Available from: <https://doi.org/10.1007/s00264-010-1197-z>
2. Phalak MO, Chaudhari AK, Chaudhari T, Birajdar A. Dr. John H. Charnley: An Architect and Pioneer of the Modern Era of Hip Replacement Surgery. *Cureus* [Internet]. 2024 Sept 6 [cited 2026 Mar];16(9). Available from: <http://dx.doi.org/10.7759/cureus.68832>
3. Knight SR, Aujla R, Biswas SP. Total Hip Arthroplasty – over 100 years of operative history. *Orthopedic Reviews* [Internet]. 2011 Sept 6 [cited 2025 Nov];3(2). Available from: <https://doi.org/10.4081/or.2011.e16>
4. Aswal DVK. Outcome of Patients Treated with Total Hip Arthroplasty for Various Disorders of Hip: A Retrospective Study. Zenodo (CERN European Organization for Nuclear Research) [Internet]. 2025 Nov 26 [cited 2025 Dec]; Available from: <https://doi.org/10.5281/zenodo.17831695>
5. Singh JA. Epidemiology of Knee and Hip Arthroplasty: A Systematic Review. *The Open Orthopaedics Journal* [Internet]. 2011 Mar 16 [cited 2026 Jan];5(1):80–5. Available from: <https://doi.org/10.2174/1874325001105010080>
6. Patel I, Nham FH, Zalikha AK, El-Othmani MM. Epidemiology of total hip arthroplasty: demographics, comorbidities and outcomes. *Arthroplasty* [Internet]. 2023 Jan 2 [cited 2026 Jan];5(1):2–2. Available from: <https://doi.org/10.1186/s42836-022-00156-1>
7. Jain P, Sao S, Patond KR. Statistical analysis of total hip arthroplasty at rural hospital in Maharashtra under MJPJAY: a prospective study. *International Journal of Research in Orthopaedics* [Internet]. 2024 Oct 25 [cited 2026 Mar];10(6):1278–83. Available from: <https://doi.org/10.18203/issn.2455-4510.intjresorthop20243123>
8. Liu YEB, Hu SC, Chan SP, Sathappan SS. The epidemiology and surgical outcomes of patients undergoing primary total hip replacement: an Asian perspective. *PubMed* [Internet]. 2009 Jan 1 [cited 2025 Nov];50(1):15–9. Available from: <https://pubmed.ncbi.nlm.nih.gov/19224079>

9. Aneja K, Machaiah PK, Shyam A. The Indian Joint Registry: Building Trust, Safety, and Excellence in Indian Orthopedics. *Journal of Orthopaedic Case Reports* [Internet]. 2025 Jan 1 [cited 2026 Jan];15(11):439–45. Available from: <https://doi.org/10.13107/jocr.2025.v15.i11.6426>
10. Konan S, Abdel MP, Haddad FS. Cemented versus uncemented hip implant fixation. *Bone and Joint Research* [Internet]. 2019 Dec 1 [cited 2025 Nov];8(12):604–7. Available from: <https://doi.org/10.1302/2046-3758.812.bjr-2019-0337>
11. Morshed S, Bozic KJ, Ries MD, Malchau H, Colford JM. Comparison of cemented and uncemented fixation in total hip replacement. *Acta Orthopaedica* [Internet]. 2007 Jan 1 [cited 2026 Jan];78(3):315–26. Available from: <https://doi.org/10.1080/17453670710013861>
12. Hailer NP, Garellick G, Kärrholm J. Uncemented and cemented primary total hip arthroplasty in the Swedish Hip Arthroplasty Register. *Acta Orthopaedica* [Internet]. 2010 Feb 1 [cited 2026 Jan];81(1):34–41. Available from: <https://doi.org/10.3109/17453671003685400>
13. Baji P, Palmer C, Moore AJ, Whitehouse MR, Evans J, Marques EMR. Factors influencing preferred fixation method in total hip replacement –a national survey of practice with consultant orthopaedic surgeons in the UK. *Explore Bristol Research* [Internet]. 2025 Nov 4 [cited 2026 Mar]; Available from: <https://research-information.bris.ac.uk/en/publications/5a32b008-bc22-44c6-ac32-50394f466b9f>
14. Shaikh AH. Preoperative Planning of Total Hip Arthroplasty. In: *InTech eBooks* [Internet]. 2018 [cited 2025 Nov]. Available from: <https://doi.org/10.5772/intechopen.76368>
15. Healy W. Hip Implant Selection for Total Hip Arthroplasty in Elderly Patients. *Clinical Orthopaedics and Related Research* [Internet]. 2002 Dec 1 [cited 2026 Jan];405(405):54–64. Available from: <https://doi.org/10.1097/00003086-200212000-00007>
16. Mishra SR, Singh YV, Gupta AK. Learning Experiences from Orthopedic Disability Camp in a Tribal Area of Central India. *Medical Journal of Dr D Y Patil Vidyapeeth* [Internet]. 2022 Jan 22 [cited 2025 Nov];15(3):376–80. Available from: https://doi.org/10.4103/mjdrdypu.mjdrdypu_617_20
17. Kim TK. CORR® International - Asia-Pacific: Poverty and its Implications on Orthopaedic Care. *Clinical Orthopaedics and Related Research* [Internet]. 2018 Apr 26 [cited 2025 Nov];476(6):1154–6. Available from: <https://doi.org/10.1097/01.blo.0000533637.94194.ad>
18. Pradhan N, Tamang M, Rai S, Gyaltsen C, Dema C, Mynak ML, et al. Reducing Health Inequities Through Total Knee Arthroplasty: An Experience From Bhutan. *Health Science Reports* [Internet]. 2025 Feb 1 [cited 2025 Dec];8(2). Available from: <https://doi.org/10.1002/hsr2.70459>
19. Richa R, Kumar V, Bhattacharya S, Barik S, Raj V. Setting up of tertiary care institutes in rural India: Not the sole remedy for all maladies plaguing the health system. *Journal of Family Medicine and Primary Care* [Internet]. 2025 May 1 [cited 2025 Nov];14(5):2048–52. Available from: https://doi.org/10.4103/jfmmpc.jfmmpc_1565_24
20. Saoji K, Gupta S, Chavan A, Gawande V, Jain S. A Study Of Sociodemographic Profile Of The Patients Undergoing Hip Joint Replacement In A Tertiary Hospital In Central India. *Journal of Pharmaceutical Negative Results* [Internet]. 2022 Oct 20 [cited 2025 Nov];545–8. Available from: <https://doi.org/10.47750/pnr.2022.13.s05.89>
21. George A, Ofori-Atta P. Joint replacement surgery in Ghana (West Africa)—an observational study. *International Orthopaedics* [Internet]. 2019 Jan 24 [cited 2026 Jan];43(5):1041–7. Available from: <https://doi.org/10.1007/s00264-019-04286-1>
22. Eskelinen A, Remes V, Helenius I, Pulkkinen P, Nevalainen J, Paavolainen P. Total hip arthroplasty for primary osteoarthritis in younger patients in the Finnish arthroplasty register. *Acta Orthopaedica* [Internet]. 2005 Jan 1 [cited 2026 Jan];76(1):28–41. Available from: <https://doi.org/10.1080/00016470510030292>
23. Flécher X, Pearce O, Parratte S, Aubaniac J, Argenson JN. Custom Cementless Stem Improves Hip Function in Young Patients at 15-year Followup. *Clinical Orthopaedics and Related Research* [Internet]. 2009 Aug 18 [cited 2026 Jan];468(3):747–55. Available from: <https://doi.org/10.1007/s11999-009-1045-x>
24. Yu XY, Qiao Y, Li X, Li ZY, Zhan L, Song XY, et al. Medium-term outcomes of uncemented total hip arthroplasty in patients younger than 25 years old: A retrospective research [Internet]. *Research Square*. 2023 [cited 2026 Mar]. Available from: <http://dx.doi.org/10.21203/rs.3.rs-3562066/v1>
25. Sharma Y, Sridevi P, Bhat D, Surti SB, Sarmah J, Sudhakar G, et al. Access to Healthcare Among Tribal Population in India: A Cross-Sectional Household Survey. *The International Journal of Health Planning and Management* [Internet]. 2025 Mar 11 [cited 2025 Dec];40(4):863–70. Available from: <https://doi.org/10.1002/hpm.3924>
26. Thomas B, Thiruvengadam K, Raghavi S, Rani S, Vetrivel S, Rao VG, et al. Understanding health care-seeking behaviour of the tribal population in India among those with presumptive TB symptoms. *PLoS ONE* [Internet]. 2021 May 20 [cited 2026 Jan];16(5). Available from: <https://doi.org/10.1371/journal.pone.0250971>
27. Delaunay C, Bonnomet F, Clavert P, Laffargue P, Migaud H. THA Using Metal-on-Metal Articulation in Active Patients Younger Than 50 Years. *Clinical Orthopaedics and Related Research* [Internet]. 2008 Jan 24 [cited 2026 Jan];466(2):340–6. Available from: <https://doi.org/10.1007/s11999-007-0045-y>