Section: Orthopaedic Surgery

Original Research Article

PROSPECTIVE STUDY ON POST COVID COMPLEX HIP CASES MANAGED BY TOTAL HIP ARTHROPLASTY

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ABSTRACT

Background: The COVID-19 pandemic delayed elective surgeries, including total hip arthroplasty (THA), increasing complex hip cases such as neglected neck of femur fractures, failed osteosynthesis, bony ankylosis, and severe contractures, which heighten surgical difficulty and complication risk. This study assessed the functional outcomes of complex hip cases treated with THA after pandemic-related delays. **Materials and Methods:** This prospective observational study included 20 patients at the Government Vellore Medical College and Hospital, from December 2020 to December 2022. All patients had thorough preoperative assessment, THA via the modified Hardinge approach, and structured postoperative care, with outcomes monitored using Harris Hip Score and radiographs up to 6 months. **Result:** Of the 20 patients, 12 (60%) were male and 8 (40%) female. Age distribution was 3 (15%) in 20–30 years, 6 (30%) in 31–50 years, and 11 (55%) in 51–70 years. Side involvement was right in 9 (45%), left in 9 (45%), and bilateral in 2 (10%). 19 (95%) patients underwent uncemented THA, and one (5%) underwent cemented THA. Dorr's ratio was type A in 9 (45%), type B in 10 (50%), and type C in 1 (5%). Functional outcomes were excellent in 7 (35%), good in 10 (50%), fair in 2 (10%), and poor in 1 (5%). Complications included limb-length discrepancy in three (15%), hip dislocation in two (10%), and superficial infection in one (5%). **Conclusion:** Complex hip cases managed with total hip arthroplasty post–COVID-19 showed predominantly good to excellent outcomes, with few complications, demonstrating its feasibility even in delayed, complex presentations.

INTRODUCTION

The COVID-19 pandemic has resulted in widespread disruptions in healthcare delivery, especially in elective surgical services such as total hip arthroplasty (THA), leading to significant treatment delays worldwide. Elective joint replacement surgeries, including THA and total knee arthroplasty (TKA), were postponed en masse, generating substantial surgical backlogs. For instance, data from the United States indicated a sharp decline in elective THA volumes by 68.8 % during the second quarter of 2020, while same-day discharge rates doubled during the pandemic despite stagnant complication rates.[1]

Similar suspensions of elective surgeries have been reported globally, and arthroplasty cases have been delayed due to pandemic constraints. These delays forced many patients to postpone timely hip fracture management or seek alternative treatments, often resulting in increasing complexity of their hip pathology.[2]

When THA is deferred, particularly in cases such as neglected neck-of-femur (NOF) fractures, failed osteosynthesis, chronic arthritis, or bony ankylosis, patients often present with aggravated deformities and soft-tissue contractures. These conditions increase the difficulty of surgery, requiring advanced planning, careful templating, and intraoperative adaptation. The level of technical complexity in such delayed cases magnifies the risk of complications during THA, including dislocation, limb-length discrepancy, infection, and neurovascular injury.[3,4]

Recent literature emphasises the need to evaluate the impact of pandemic-related delays on THA outcomes. In one multicenter, propensity-matched study encompassing 2020–2022, COVID-19 history was associated with increased postoperative pneumonia and urinary tract infections, though not significantly linked to periprosthetic joint infection, dislocation, or thromboembolic events.[5] Another

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large cohort study found that undergoing THA within 12 weeks of a positive COVID-19 diagnosis significantly increased postoperative mortality and thrombotic complications, indicating the necessity for optimal surgical timing and risk stratification.[6] Additionally, case reports have highlighted adaptive surgical approaches to manage complex hip revisions that were further compounded by pandemic-induced delays.[7]

In resource-constrained settings, these delays frequently led to a rise in complex hip presentations, particularly neglected NOF fractures, due to patients' preference for native, non-hospital treatment during the COVID-19 outbreak. This resulted in anatomically challenging scenarios involving soft tissue contracture, bony ankylosis, hardware removal needs, and compromised bone stock.[8]

This study aimed to evaluate the functional outcomes of complex hip cases managed by Total Hip Arthroplasty after the COVID-19 outbreak.

MATERIALS AND METHODS

Study design and setting: This prospective observational study included 20 patients from the Department of Orthopaedic Surgery, Government Vellore Medical College and Hospital, from December 2020 to December 2022. This study focused on patients presenting with complex hip pathologies that required THA and whose treatment was delayed because of the COVID-19 outbreak. All procedures were performed by the same orthopaedic surgical team using a standardised operative protocol. Ethical clearance was obtained from the Institutional Ethics Committee before the commencement of the study, and written informed consent was obtained from all the participants.

Inclusion criteria

Patients aged > 20 and < 70 years were eligible if they had neglected neck of femur fractures, failed osteosynthesis, bony ankylosis following inflammatory arthritis, or severe soft tissue contracture around the hip joint.

Exclusion criteria

Patients with primary osteoarthritis of the hip, inflammatory arthritis without complications, secondary arthritis due to Perthes disease, or acute neck of femur fractures were excluded.

Method: After enrolment, each patient underwent a detailed preoperative evaluation that included clinical examination, radiological imaging, and templating to assess bone stock, deformity, limb length discrepancy, and medullary canal morphology. Dorr's classification was used to determine whether cemented or uncemented femoral components were appropriate. Preoperative planning also involved identifying anatomical landmarks, calculating femoral and acetabular offsets, and determining the centre of rotation.

All surgeries were performed using the modified Hardinge lateral approach under regional or general anaesthesia. Intraoperative challenges, such as contracted soft tissues, tight medullary canals, hardware removal, and identification of the joint line in bony ankylosis, were addressed using standardised techniques developed by the surgical team. The acetabular components were positioned using freehand techniques with an inclination of approximately 40-45° and anteversion of 20-25°, whereas the femoral components were sized and positioned to restore leg length and offset as closely as possible to the native anatomy.

Postoperative care was performed according to a structured protocol. Prophylactic antibiotics were administered 30 minutes before the incision and continued for 72 hours, with additional doses if the surgery exceeded three hours. The operated limb was elevated for 48 hours, and ankle pump and quadriceps exercises were initiated on day 1. The urinary catheter and surgical drain were removed on day 2, and deep vein thrombosis prophylaxis was provided to high-risk patients. Before discharge, patients were advised on bedside toilet care and the use of western or chair-type toilets. Haemoglobin levels were monitored postoperatively and corrected with transfusion or iron supplementation as needed. Wound dressings were changed on days 2, 5, 7, and 10, and sutures were removed between days 10 and 12. Non-weight-bearing was maintained for six weeks, followed by partial weight-bearing with a walker for three and six months, and then progression to full weight-bearing as tolerated.

Functional outcomes were assessed using the HHS at three weeks, three months, and six months postoperatively. Radiographic evaluations were performed at the same intervals to monitor the implant position and detect any complications.

Statistical analysis: Data were entered into Microsoft Excel and analysed using IBM SPSS Statistics V 24. Categorical variables are presented as frequencies and percentages.

RESULTS

The age distribution showed 3 (15%) patients were 20-30 years, 6 (30%) were 31-50 years, and 11 (55%) were 51-70 years. Of the 20 patients, 12 (60%) were male and 8 (40%) were female. Regarding side predilection, both right and left sides were equally involved in nine (45%) patients each, while bilateral involvement was seen in two (10%) patients. In terms of the type of Total Hip Replacement (THR) performed, 19 (95%) patients underwent uncemented THR, and 1 (5%) underwent cemented THR [Table 1].

Dorr's ratio classification showed that 9(45%) patients belonged to type A, 10 (50%) to type B, and 1(5%) to type C. Functional outcome assessment revealed excellent results in 7 (35%) patients, good in 10 (50%), fair in 2 (10%), and poor in 1 (5%). Complications following complex THR included limb length discrepancy in 3 (15%) patients, hip

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dislocation in 2 (10%) patients, and superficial infections in 1 (5%) patient [Table 2].

Table 1: Demographic and clinical characteristics

Category	Subtype	N (%)
Age group (years)	20-30	3 (15%)
	31-50	6 (30%)
	51-70	11 (55%)
Sex	Male	12 (60%)
	Female	8 (40%)
Side predilection	Right	9 (45%)
	Left	9 (45%)
	Bilateral	2 (10%)
Type of THR	Uncemented	19 (95%)
	Cemented	1 (5%)

Table 2: Radiological, functional, and complication profile

Category	Subtype	N (%)
Dorr's ratio	A	9 (45%)
	B	10 (50%)
	C	1 (5%)
Functional outcome	Excellent	7 (35%)
	Good	10 (50%)
	Fair	2 (10%)
	Poor	1 (5%)
Complications of complex THR	Limb length discrepancy	3 (15%)
	Hip dislocation	2 (10%)
	Superficial infections	1 (5%)

Case Illustration 1:
Right neglected neck of femur fracture with femoral shaft overriding and neck resorption

Figure 1

Figure 2

Complications & Management

1. Hip Dislocation

Presentation: Right neglected neck of femur fracture with femoral shaft overriding. The immediate postoperative period revealed right hip joint dislocation [Figure 3].

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Figure 3: Immediate PostOP

Management:

- Closed reduction attempted under C-arm guidance using short GA was unsatisfactory.
- Open reduction was performed with cup revision, followed by the application of a de-rotation bar with 15° abduction for three weeks to allow soft tissue healing [Figure 4].

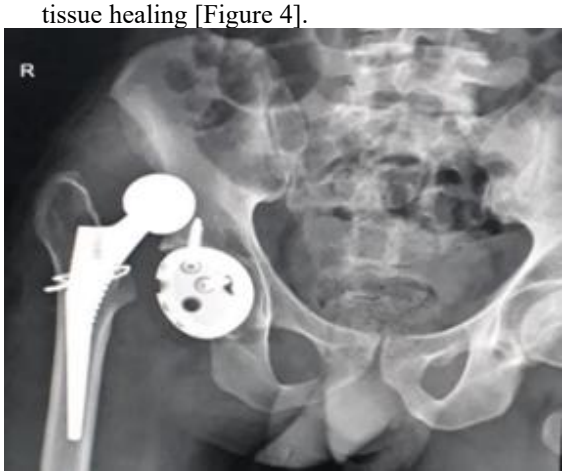

Figure 4

2. Limb Length Discrepancy

- Presentation: Bilateral chronic hip arthritis with dysplastic femur and acetabulum [Figure 5].

Figure 5

- **Postoperative Findings:** Significant 3 cm shortening on the right side.
- **Management:** The patient was managed with heel-raising shoes [Figure 6].

Figure 6

DISCUSSION

In our study of 20 patients undergoing complex THR, there was a male predominance, with 12 (60%) males and 8 (40%) females. The majority of patients (55%) were in the 51–70 years age group, followed by 31–50 years (30%), and 20–30 years (15%). Right and left hip involvement was equally common, each seen in nine (45%) patients, while bilateral involvement occurred in two (10%) patients. Uncemented THR was the predominant procedure, performed in 19 (95%) patients, whereas cemented THR was performed in only one (5%) patient. Lakhotia et al. studied 50 patients (76 hips) with a mean age of 43.24 years (range, 20–65 years) and a male predominance of 68%.[9]

Rafeeq et al. studied 30 patients (39 hips) with a mean age of 39 years (range, 20–70 years) and a male predominance of 70%. Bilateral involvement was observed in 30% of patients, whereas 36.67% had

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right-sided and 33.33% had left-sided disease. The main indication for surgery was secondary osteoarthritis in 85% of cases, most commonly due to avascular necrosis (66.67%), followed by trauma (10.26%) and Perthes disease (7.69%). Primary osteoarthritis accounted for 15% of cases.[10] Marahatta et al. reported a similar male predominance of 59% and female 41%. Their patients were aged 21–75 years, with a mean age of 48 years, which is younger than the mean age of our older cohort. They observed a higher right-side involvement (55%) than left-side involvement (45%), in contrast to our equal distribution. Their main surgical indications included avascular necrosis (36%) and primary osteoarthritis (24%).[11]

In our study, Dorr's classification showed that type B morphology was the most common, observed in 10 (50%) patients, followed by type A in 9 (45%) and type C in 1 (5%). Functional outcomes assessed postoperatively revealed good results in 10 (50%) patients, excellent in 7 (35%), fair in 2 (10%), and poor in 1 (5%). Harold et al. assessed functional recovery using PROMIS and modified Harris Hip Score (mHHS) at multiple intervals up to 52 weeks postoperatively. They reported significant improvements in both the PROMIS and mHHS scores, with near-normal values achieved by 12 weeks and sustained at 1 year. Strong correlations were found between PROMIS total scores and mHHS ($r = 0.73–0.80$) postoperatively.[12]

Kladny et al. reported a marked improvement in the Harris Hip Scores between admission and discharge. The proportion of patients rated as "good" or "very good" increased from 0.3% at admission to 93.6% at discharge. The percentage of pain-free patients increased from 20.4% to 56.2%, and those with only occasional slight pain decreased from 46.4% to 39.3%. Mobility measures also improved substantially, with more patients able to walk > 600 m (from 5.3% to 55.0%) and climb stairs without aids (from 0% to 7.7%).[13]

Lakhotia et al. reported a significant improvement in the mean modified Harris Hip Score (mHHS) from 13.28 preoperatively to 88.52 at a minimum five-year follow-up ($p<0.001$), with 80% of patients achieving excellent to good outcomes. Improvements were also observed across individual functional domains, such as pain, limp, walking distance, stairs, and professional activities. At the final follow-up, 92% of patients reported no or slight pain, and most had returned to their original occupations or activities.9 Rafeeq et al. reported a mean preoperative Harris Hip Score of 39.7, which improved to 88.04 immediately postoperatively and 94 (range 86–97) at the latest follow-up. At the final review, 97% of the patients achieved excellent results, and 3% achieved good results. No cases of osteolysis or loosening were observed, with the femoral stem in a neutral position in 92.31% of cases.[10]

Onuoha et al. reported an average preoperative modified Harris Hip Score (mHHS) of 26.79 ± 13.1 (poor), which increased to 84.75 ± 5.29 at 24 weeks postoperatively, indicating good to excellent function in most patients. Six patients achieved excellent outcomes (90–100), 17 achieved good outcomes (80–89), and five had fair outcomes (70–79). Early initiation of physiotherapy (within 1–2 weeks) and early weight bearing (partial by 1–2 weeks, full by 5–6 weeks) were associated with better functional outcomes.[14]

In our study, postoperative complications were observed in six (30%) patients. The most common complication was limb length discrepancy, which occurred in three (15%) patients, followed by hip dislocation in two (10%) and superficial infection in one (5%). Rafeeq et al. documented an overall complication rate of 10.26%, which included limb length discrepancy (5%), superficial infection (2.56%) that resolved within two weeks, and one case of Vancouver type A periprosthetic fracture (2.56%) treated conservatively with union achieved. No cases of deep infection were observed.[10]

Onuoha et al. reported no postoperative complications during the 24-week follow-up.14 Marahatta et al. assessed functional outcomes using the Harris Hip Score, reporting 85% excellent, 9% good, and 6% fair results, closely matching our functional outcome proportions. However, their complication rates were lower, with 2% superficial infections and 2% hip dislocations, and they reported some unique complications such as screw irritation and trochanter avulsion.[11]

Kumar et al. evaluated 122 hips using the Harris Hip Score (HHS) and Modified Harris Hip Score (MHHS) for various diagnoses, including avascular necrosis, trauma, osteoarthritis, rheumatoid arthritis, ankylosing spondylitis, and tuberculosis. They reported mean HHS values ranging from 66.5 to 93.25, depending on the diagnosis. There was a very strong correlation between HHS and MHHS (Pearson's correlation, $p = 0.002$), with excellent reliability demonstrated by Cronbach's alpha of 0.951 and intraclass correlation coefficients above 0.9 ($p < 0.001$).[15]

Limitations

This study was limited by its single-centre design and relatively small sample size, which may affect generalisability. Additionally, the short-term follow-up period restricted the assessment of the long-term outcomes.

CONCLUSION

Complex hip cases managed with total hip arthroplasty after the COVID-19 outbreak achieved predominantly good to excellent functional outcomes, with a low incidence of complications such as limb length discrepancy, dislocation, and superficial infection. These results highlight the feasibility of successful THA, even in delayed and complex presentations. Future research should focus on larger multicentre studies with longer follow-up periods to assess implant survival, functional

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longevity, and quality-of-life improvements over time.

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