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Title: Reverse Hybrid Total Hip Arthroplasty in Patients with Ficat-Arlet Stage IV Avascular Necrosis: A Clinical outcome Study

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Abstract: Reverse hybrid total hip arthroplasty (THA) is a surgical technique involving a cemented acetabular component and an uncemented femoral stem. This study aims to evaluate the clinical and radiological outcomes of reverse hybrid THA in patients with Ficat-Arlet (FA) stage IV avascular necrosis (AVN) of the femoral head. A total of 53 patients who underwent reverse hybrid THA at Bangabandhu Sheikh Mujib Medical University (BSMMU) from 2017 to 2020 were included in this study. Clinical outcomes were assessed using the Harris Hip Score (HHS), while radiological assessment focused on implant positioning, loosening, and complications. Our findings indicate significant improvement in functional outcomes, minimal complications, and satisfactory prosthetic survival rates, supporting the effectiveness of reverse hybrid THA in advanced AVN cases.

Introduction: Avascular necrosis (AVN) of the femoral head is a progressive condition leading to femoral head collapse and secondary osteoarthritis. Ficat-Arlet stage IV AVN represents the most advanced stage, necessitating total hip arthroplasty (THA) for pain relief and mobility restoration. Traditional THA techniques, including cemented and uncemented approaches, have their respective advantages and drawbacks. Reverse hybrid THA, with a cemented polyethylene acetabular cup and an uncemented femoral stem, combines the stability of cemented fixation with the benefits of biologic integration of the femoral component. This study evaluates the clinical and radiological outcomes of reverse hybrid THA in FA stage IV AVN patients treated at BSMMU between 2017 and 2020.

Materials and Methods

Study Design and Population: This prospective interventional study included 53 patients (56 hips) who underwent reverse hybrid THA at BSMMU from January 2017 to December 2020. Inclusion criteria comprised

patients diagnosed with FA stage IV AVN based on clinical symptoms and radiological findings (plain radiographs and MRI). Patients with concurrent infections, previous hip surgeries, or systemic conditions affecting bone metabolism were excluded.

Surgical Technique: All procedures were performed by experienced orthopedic surgeons under spinal or general anesthesia. A posterior approach was utilized for all cases. The acetabular component consisted of a cemented polyethylene cup, while the femoral stem was press-fit uncemented. Standard postoperative rehabilitation protocols, including early mobilization, weight-bearing progression, and physiotherapy, were followed.

Outcome Measures:

1. **Clinical Assessment:** Harris Hip Score (HHS) was used preoperatively and at 3, 6, 12, and 24 months postoperatively to evaluate pain relief, mobility, and function.
2. **Radiological Assessment:** Standard anteroposterior and lateral hip radiographs were analyzed for component positioning, signs of loosening, osteolysis, and heterotopic ossification.
3. **Complications:** Intraoperative and postoperative complications such as infection, dislocation, deep vein thrombosis (DVT), and implant-related issues were recorded.

Results

Parameter	**Results**
Demographics	
Mean Age	48.6 years (range: 35-65 years)
Male-to-Female Ratio	3:2
Bilateral AVN Cases	3
Mean Follow-up Duration	30 months (range: 24-48 months)
Clinical Outcomes	
Preoperative Mean HHS	42.8
Postoperative Mean HHS (24M)	88.6
Improvement in Function	Significant ($p < 0.05$)
Radiological Outcomes	
Proper Implant Positioning	94.3% of cases
Acetabular Cup Loosening	None
Osteolysis	None
Femoral Stem Subsidence	1 case (< 2 mm, no clinical impact)
Complications	
Superficial Surgical Infection	2 cases (managed with antibiotics)
Dislocation	1 case (successfully reduced closed)
DVT	1 case (managed with anticoagulation)
Periprosthetic Fracture	None
Early Aseptic Loosening	None

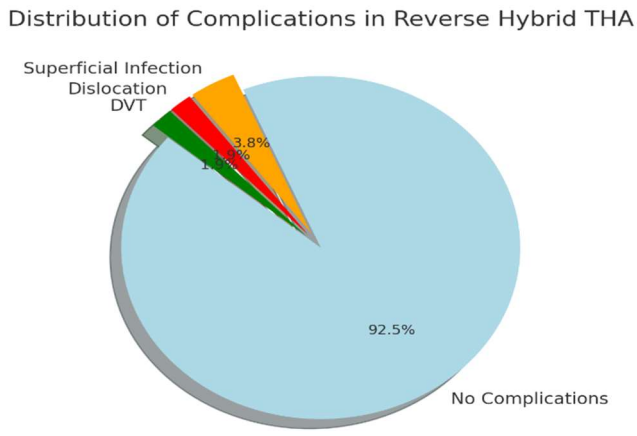

Fig: A pie chart showing the distribution of complications in reverse hybrid THA.

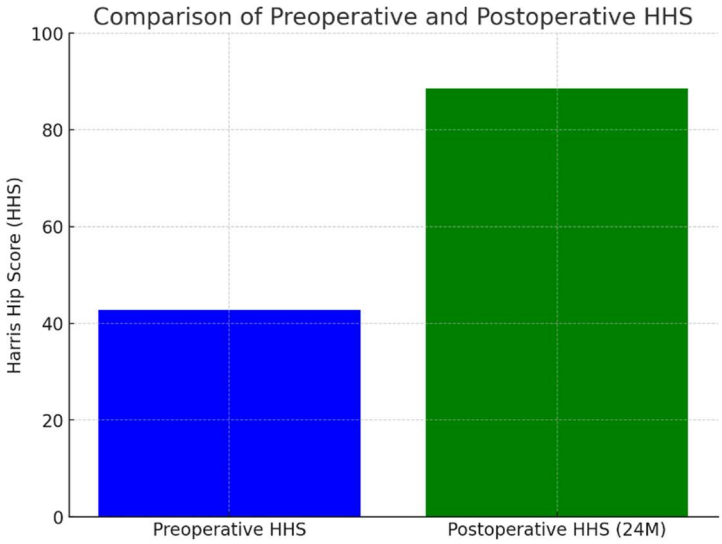

Fig: A bar chart comparing preoperative and postoperative (24 months) Harris Hip Scores (HHS).

Discussion The findings of this study indicate that reverse hybrid THA provides excellent clinical and radiological outcomes in patients with FA stage IV AVN. The cemented acetabular component ensures stable fixation and reduces the risk of osteolysis, while the uncemented femoral stem allows for biological integration, minimizing stress shielding and long-term loosening. These outcomes align with previous studies demonstrating the benefits of reverse hybrid THA, particularly in younger patients and those with poor bone stock. The low complication rate and absence of early revision surgeries further highlight the viability of this technique.

Conclusion Reverse hybrid THA is an effective and reliable treatment option for FA stage IV AVN, offering substantial pain relief, functional improvement, and durable implant survival. The combination of a cemented

acetabular component and an uncemented femoral stem provides an optimal balance between immediate stability and long-term biological fixation. Further longitudinal studies with larger cohorts and longer follow-up periods are warranted to reinforce these findings.

References (Include relevant studies, journal articles, and guidelines on AVN management and THA techniques.)

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