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THA in young: What's the consensus?

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Abstract
Introduction: Total hip arthroplasty (THA) has dramatically relieved pain and improved function in patients with advanced joint disease. Improvements in bearing surfaces have allowed indications to include younger patients. In spite of the advances in joint preserving surgical techniques, many patients present with advanced joint disease, which is not amenable to joint-salvage procedures.
Method: Our study included 37 patients between 18 and 35 years of age. Prospective follow-up study was conducted at department of orthopaedics in Vydehi Institute of Medical Sciences and Research Centre, Bengaluru during period 2011-2016. Patient with advanced hip arthritis falling under the above age group were included. Functional results were measured by the Harris hip score for follow-up period of 3 years.
Results: The data was analysed with Paired T test. There was statistically significant improvement (with p-valve < 0.001) of clinical as well as functional parameters. Mean pre-operative Harris hip score 65.95 and mean post-operative Harris hip score is 88.27.
Conclusions: Total Hip Arthroplasty is an excellent option for management of end stage hip disease in young adults (shown by improved pain and outcome scores). Additional planning is necessary, due to complicated nature of deformities. Modern uncemented implants, alternate bearing surfaces have significantly improved longevity and reduced revision rates.

Keywords: Total hip arthroplasty, young patients, outcomes, challenges

Introduction
Total hip arthroplasty is one of the most frequently done surgery in orthopaedics [1-2]. Though originally surgery was intended for elderly patients with the improvement in techniques and biomaterials the number has increased over the last decade in more active younger patients [3-11].

That is the main treatment for reliving pain, restoring function and mobility for various end stage degenerative conditions namely Osteonecrosis / Avascular necrosis of femoral head, Secondary osteoarthritis (Developmental dysplasia of hip, Perthes, Slipped capital femoral epiphysis, Posttraumatic, Post septic sequelae) inflammatory arthritis (Rheumatoid arthritis & Ankylosing Spondylitis) Old Fracture neck of femur [12-14]. Numerous problems may be encountered while performing THA in young patients which may affect the implant survival [15-16].

We undertook the study to evaluate the clinical and functional outcome in young patients between 18 and 35 years of age at a short term follow up of 3 years.

Materials and Methods
Prospective follow-up study was conducted at Department of Orthopaedics in Vydehi institute of medical sciences and research centre, Bengaluru during period 2011-2016.
Patient with advanced hip arthritis falling under the age group between 18 and 35 years of age were included. In our study 72 patients were initially considered eligible to be included in the study. 35 patients were eventually excluded from the study due to no follow up data, leaving 37 (hips) patients,19 male and 18 female patients (Figure 1) available for final analysis. The main indication for THA was osteonecrosis of femoral head (10 hips, 27%), followed by inflammatory arthritis - ankylosing spondylitis (8 hips, 22%) & rheumatoid arthritis (6 hips, 16%), nonunion fracture neck of femur (8 hips, 22%) and lastly, Secondary osteoarthritis

(Developmental dysplasia of the hip, Dysplasia, Perthes, slipped capital femoral epiphysis, Posttraumatic, Post septic sequelae) (5 hips, 13%) (Figure 2).

All surgeries were performed at the Department of Orthopaedics in Vydehi institute of medical sciences and research centre, Bengaluru under combined spinal and epidural anaesthesia. Informed written consent was taken from all patients. A posterolateral approach was used in all patients.

In 13 hips a ceramic on polyethylene design was used, in 19 hips a metal on polyethylene design, 4 hips a ceramic on ceramic and in 1 a metal on metal (Figure 3). We have used head size of 28, 32 and 36 in 15, 19 and 3 patients respectively (Figure 4).

Functional results were measured by the Harris hip score for follow-up period of 3 years (Figure 5 and 6).

Results

The data was analysed with Paired T test. There was statistically significant improvement (with p-valve < 0.001) of clinical as well as functional parameters. Mean pre-operative Harris hip score 65.95 and mean post-operative Harris hip score is 88.27

We noticed that there was significant increase in the functional outcome between the 6^{th}, 12^{th}, 24^{th} and 36^{th} month follow up. At the end of 36 months follow up seventeen patients had excellent, seventeen patients had good and remaining three had fair results in terms of Harris hip score.

Discussion

Here in our study we included Young adults who are defined as people between 18 and 35 years of age. The main goals to perform THA in young patients is to relieve pain, maintain activity levels, restore hip function and in total to enhance quality of life [2, 17].

The complexity of performing THA in young adult patients requires greater degree of pre-operative planning to ensure success.

Preoperative planning includes component selection for both femoral and acetabulum.

Femoral and acetabular components of various designs and materials are currently available. Appropriately selected and accurately implanted components generally predicted to yield good results in a high percentage of patients. No single system or implant design is appropriate for all patients, and knowledge of the all variety of systems and component designs with their weaknesses and strengths is an asset to the surgeon.

Femoral component selection should be individualized considering the quality of proximal femur bone, presence of previous instrumentation, need for diaphyseal fixation and longer stem to bypass insufficient proximal femur bone stock and various substantial number of factors. Likewise, Acetabulum component should be selected considering acetabular bone defect, dysplasia or patients who have undergone previous fixation for fractures or osteotomies.

Challenges during different case scenario should be anticipated preoperatively and planning should be done for a successful outcome.

Avascular necrosis of femoral head

If cortical bone grafting (fibular graft) was done previously, careful attention to removing intramedullary portion of the graft completely using high speed burr should be done as conventional reamers and broaches may be ineffective and intraoperative radiographs can be of use with the broach to ensure adequate removal of the graft [18-20].

Developmental dysplasia

Acetabulum is oblong and its roof is eroded, in cases of high and intermediate dysplasia there may be a false acetabulum which is not deep/wide enough for containment. In addition to the proximal migration of femur, femoral head might be deformed, the femoral neck is short and narrow often with marked anteversion. The femoral canal is narrow and increased anterior bowing of the proximal third of femur causing preparation of canal difficult.

The acetabular cup should be implanted at native acetabulum whenever possible. For a successful surgery pre-operative templating and planning are very helpful [18, 21-24].

Ankylosing Spondylitis

Consider the involvement of the spine and possible fusion pre or post total hip arthroplasty. To avoid dislocation following total hip arthroplasty the inclination and anteversion of the components should be adjusted so as to implant the acetabular cup in position anticipated following the spinal fusion.

If the spine fusion is in lordosis, then the pelvis will be anteriorly tilted. So, inclination should be at 45° and anteversion of the cup must allow combined anteversion of 35° to 45° (anteversion is most important). Conversely, if spine fusion creates a flat-back, the pelvis is posteriorly tilted and so the cup inclination can be 40° to 45° with combined anteversion of 30° to 35° [25-27].

Failed previous trauma surgeries

In cases of previous failed osteosynthesis of femoral neck fracture, the neck may be resorbed. Hence reconstruction with standard femoral component with a long neck may be essential. Whereas in malunited or non-union trochanteric fractures the length of the femur cannot restored by using standard femoral implant. Hence, calcar replacement stem often is required.

Due the previous surgery the scar tissue and increased vascularity of sub-synovial tissue may cause excessive bleeding which should be anticipated.

Furthermore, plates and screws in the proximal femur may be covered with bone and may be difficult to remove. And removal of screws may leave a defect which can be a stress riser and cause fracture, to avoid it longer stem is required to bypass screw holes by approximately two bone diameters. If cemented component is used occlude the femoral screw holes during cementation.

If open reduction of the acetabulum was performed previously. Internal fixation devices if exposed during reaming of the acetabulum, removal of only a portion of the hardware necessary to implant the acetabular component properly and the remainder should be left undisturbed [18, 28].

Failed previous reconstruction surgeries

Careful reaming of femur following previous osteotomy should be done to avoid cortical perforation or fracture. High-speed burr may be required to remove dense intramedullary bone. If removal of previous hardware is complex, a staged procedure is appropriate. Once the soft tissues and femoral cortical defects have healed procedure can be planned.

Prior acetabular osteotomy is not thought to compromise the results of the arthroplasty [18, 20, 30].

There are numerous other factors, difficulties and issues while performing total hip arthroplasty in young fer individuals to

overcome those the surgeon's team should anticipate the problems for the individual case and through pre-operative planning should be done for a positive outcome.

The present study is limited by several factors. First of all, its limited sample size and secondly the short term follow up for the identification of implant survival. However, taking into account the fact that THAs in populations under 35years are common and is a challenging problem, prospective designs with homogenous populations regarding indications and types of arthroplasty should be the future goal.

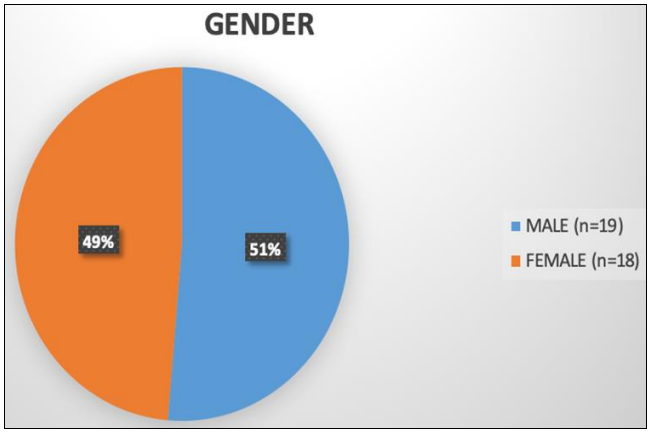


Fig 1: Gender Distribution

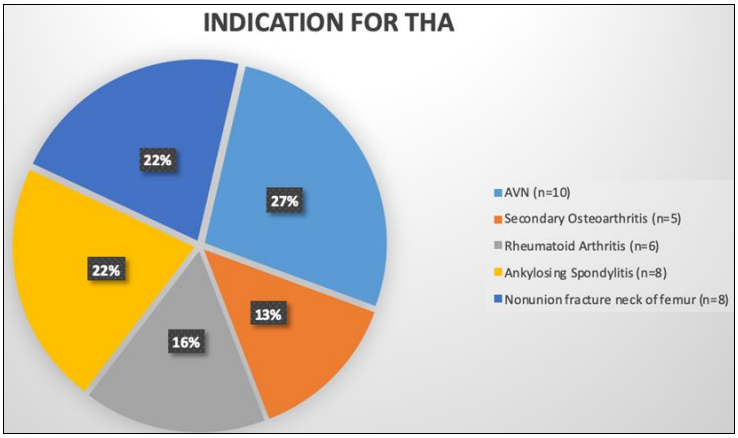


Fig 2: Indication for total hip arthroplasty in patients included in the study

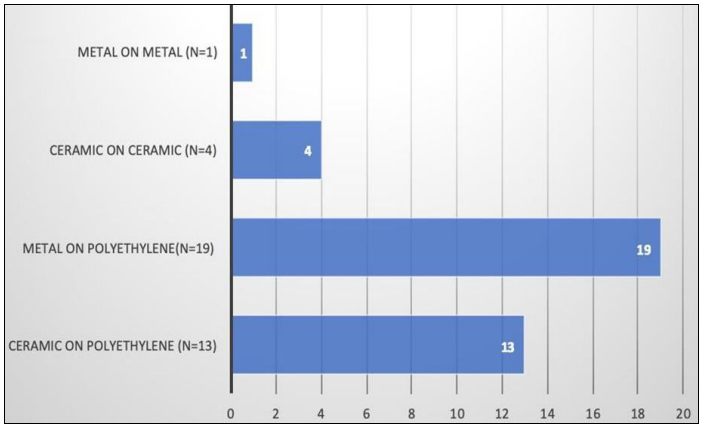


Fig 3: Implant type

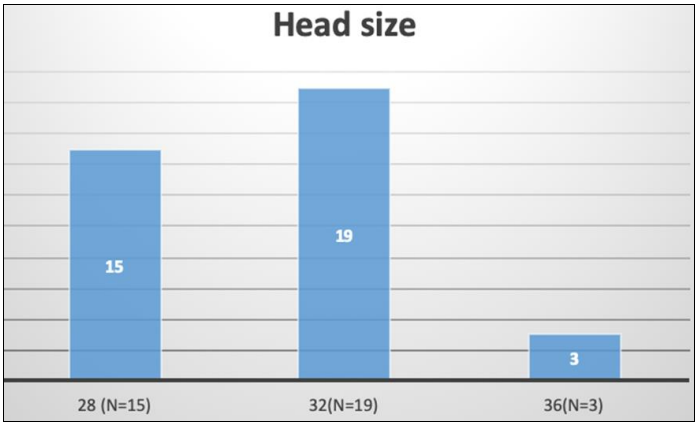


Fig 4: Head Size

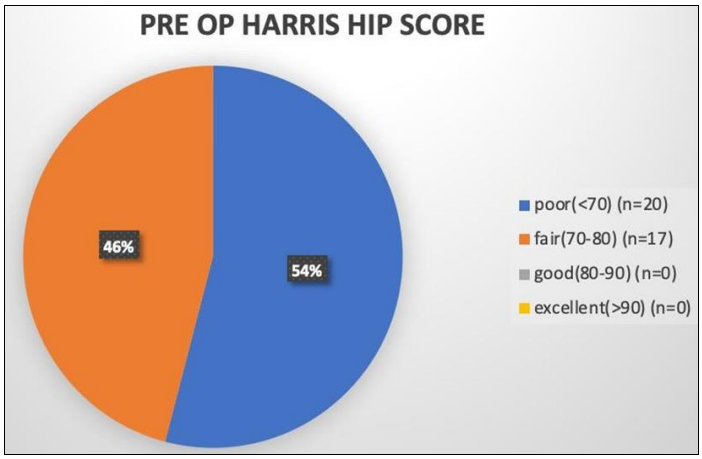


Fig 5: Pre-operative Harris Hip score

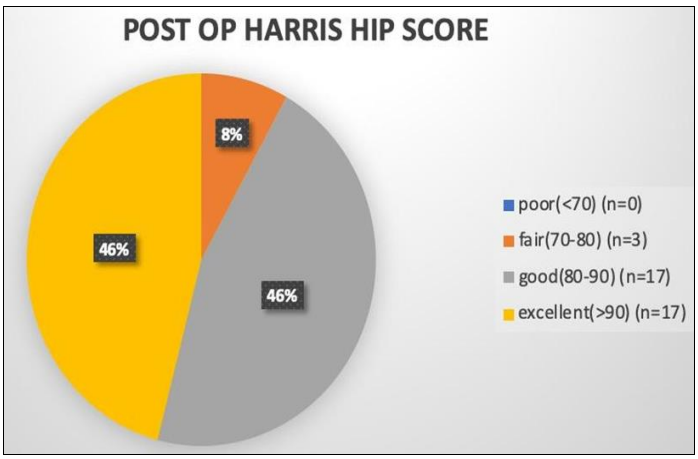
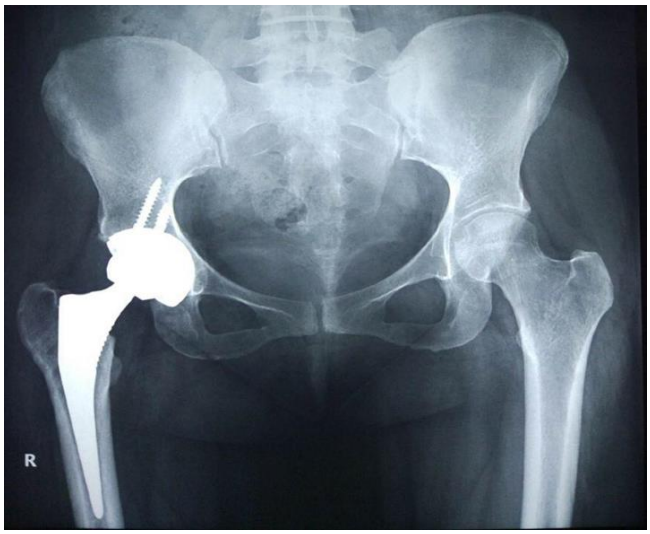


Fig 6: Post-operative Harris Hip score

Case 1A: Nonunion fracture neck of left femur with AVN changes (failed osteosynthesis)



Case 1B: Treated with uncemented right THA

Case 2A: AVN right hip with previous acetabular plate osteosynthesis

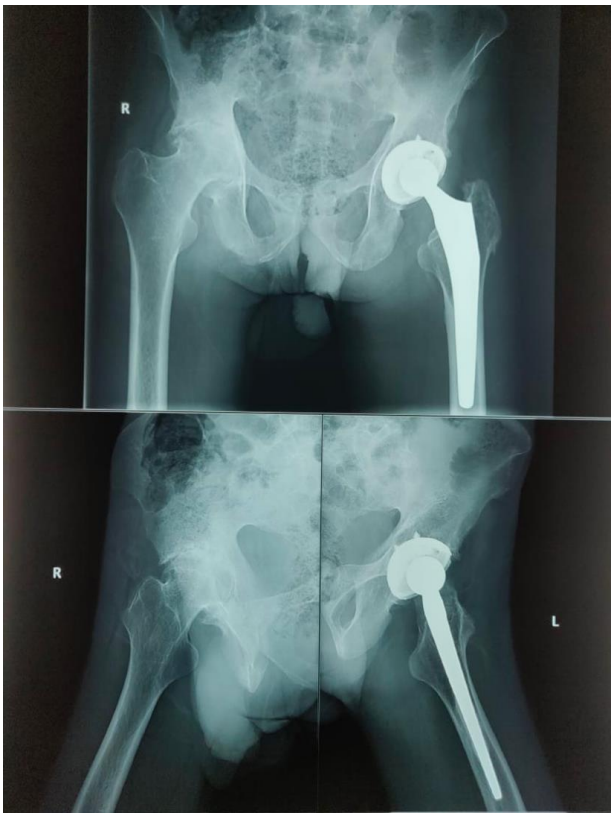
Case 2B: Treated with reverse hybrid THA (retaining the fixation device)

Case 3A: Developmental dysplasia of right hip

Case 3B: Developmental dysplasia of right hip treated with cemented THA

Case 4A: 30year female with secondary arthritis of left hip Rheumatoid arthritis) S/P Right THA

Case 4B: Secondary arthritis of left hip (Rheumatoid arthritis) treated with uncemented THA



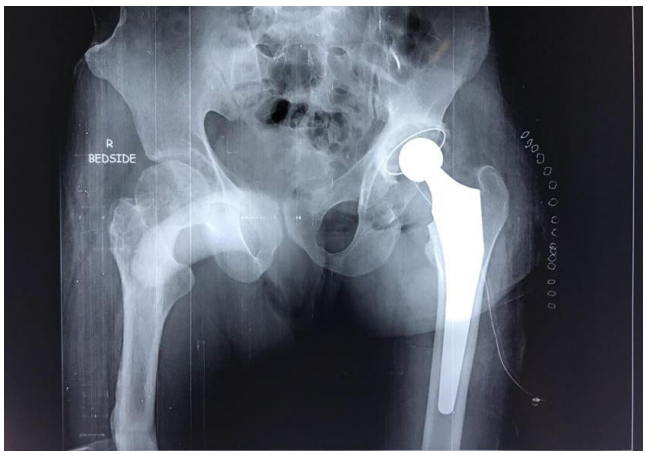
Case 5A: Secondary arthritis of right hip (Ankylosing spondylitis) S/P Left THA

Case 5B: Secondary arthritis of right hip (Ankylosing spondylitis) treated with uncemented THA

Case 6A: Neglected fracture neck of right femur

Case 6B: Neglected fracture neck of right femur – Treated with uncemented THA

Case 7A: Arthritis of left hip secondary to tuberculosis (with shortening of RT femoral segment secondary to trauma)



Case 7B: Arthritis of left hip secondary to tuberculosis – Treated with reverse hybrid THA left hip

Conclusion

Longer follow-up is necessary before definite recommendations could be given regarding THA in this young population. Nevertheless, we believe with the present data, THA is an excellent option for management of end stage hip disease in young adult patients. Additional planning is necessary, due to complicated nature of deformities. Following basic principles when performing joint preserving surgeries to simplify future conversion to THA. Modern uncemented implants, alternate bearing surfaces have significantly improved longevity and reduced revision rates.

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