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Dr. Parvez Ahmed
Professor and Head,
Department of Orthopaedics,
Swami Vivekanand Subharti
University, Meerut, Uttar
Pradesh, India

Dr. Azad Khan
Assistant Professor,
Department of Orthopaedics,
Swami Vivekanand Subharti
University, Meerut, Uttar
Pradesh, India

Dr. Rahul Gupta
Assistant Professor,
Department of Orthopaedics,
Swami Vivekanand Subharti
University, Meerut, Uttar
Pradesh, India

Dr. Nikhil Singh
Junior Resident,
Department of Orthopaedics,
Swami Vivekanand Subharti
University, Meerut, Uttar
Pradesh, India

Corresponding Author:
Dr. Nikhil Singh
Junior Resident,
Department of Orthopaedics,
Swami Vivekanand Subharti
University, Meerut, Uttar
Pradesh, India

Total hip replacement in tuberculosis of hip: A retrospective and prospective study

Dr. Parvez Ahmed, Dr. Azad Khan, Dr. Rahul Gupta and Dr. Nikhil Singh

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Abstract

Aim: This study evaluates the functional outcome in patients with active tuberculosis of hip treated with total hip replacement.

Material and Methods: 15 patients were analyzed having unilateral babbulkar and pande stage 2, 3 and 4 hip tuberculosis and with regular antituberculosis treatment for more than 4 weeks before surgery treated by total hip replacement.

Result: There was a consistent rise in the mean value of the Harris Hip Score which was 33.47 at the time of preoperative assessment and at the 6 months it got raised to 87.93, the comparison between the mean values of the intra group also came up with a significant P value of 0.01 for each and every segment and the mean values of Hip Harris Score was also noticed to be significant as well along with the competition of the same across the intra group.

Conclusion: Finally, it can be concluded from the study that total hip replacement for arthritis following the tuberculosis of the hip acts as a proper method for the patients who suffer from tuberculosis and restores them back to a good function that helps them to get back to their daily life. But a proper intra-operative workup is also very much necessary for ruling out if any residual disease is left, with proper follow up of the patient to identify if there is any recurrence. Sometimes a chance for recurrence remains during the first-year post completion of the surgery despite complete resolution of the radiological sign. But that can be taken care of with the help advanced antitubercular regimen therapy.

Keywords: Tuberculosis of hip, total hip replacement, hip Harris score

Introduction

Tuberculosis is a significant medical issue existing in the world and approximately there are around 30 million people who suffer from tuberculosis globally and the skeletal system is also involved from 1 to 3% of them.

It is a significant medical issue globally which lies among one of the top 10 reasons for the rate of mortality all over the world and this is also the chief reason of death which happens because of the infection that is created by a single type of pathogen. It is being estimated that all over the world around 10 million people on an average were affected from the year 2018 [1, 2].

It acts as a troublesome disease and commonly results in severe bone destruction, cartilage destruction and even degeneration across the hip region when the early diagnosis as well as the treatment of the disease does not get followed. During the advanced stage treatment, the issue of active tuberculosis of the hip produces some serious complications. There was an estimation that 1.2 million deaths from tuberculosis also happen across the HIV negative people. Tuberculosis in the hip takes place in around 10 to 15% of the patients suffering from skeletal tuberculosis. Tuberculosis of the hip is the second involvement site for tuberculosis after the spine [1, 3].

Several researchers have noticed that most of the patients directly report the advanced stage of the medical condition because of delayed diagnosis. During the early stages of tuberculosis in the Hip there is a sort of diagnostic dilemma as the plain X-rays turn out to be negative. However, in the present times, there has been improvement in the diagnostic modalities.

It is from those days when the diagnosis was only dependent particularly over the clinical and radiological presentation only.

In this case study we will compare both the procedures in respect to functional outcome, discuss the complications faced and their solutions.

There has been serious controversy regarding the treatment of advanced tuberculous arthritis present in the hips. The following surgical options are already present:

- Excision arthroplasty.
- Total hip replacement.
- Arthrodesis.

One of the painless ways of surgery occurring at the mobile hip within a cost of the instability with the shortening of the abnormal gate is the excision arthroplasty. Additionally, total

hip replacement after the excision arthroplasty is a complex procedure and that is why the satisfaction is not high from the same as well [3, 4].

Total hip replacement can give a painless as well as stable type of joint along with the normal gait.

Material and Methods

This study comprised of 30 cases having unilateral babhulkar and pande stage 2, 3 and 4 hip tuberculosis and with regular antituberculosis treatment for more than 4 weeks before surgery treated by total hip replacement. The study was conducted in the Department of Orthopaedics at Chhatrapati Shivaji Subharti Hospital affiliated to Netaji Subhash Chandra Bose Subharti Medical College of Swami Vivekanand University, Meerut from 2021 to 2023.

Table 1: Staging, Clinical findings and Radiologic features

Staging	Clinical findings	Radiologic features
I Stage of synovitis	Flexion, abduction, external rotation, apparent lengthening	Haziness, rarefaction
II Stage of early arthritis	Flexion, adduction, internal rotation, apparent shortening	Rarefaction, osteopenia, bony lesion in femoral head, acetabulum or both. No reduction in joint space
III Stage of arthritis	Flexion, adduction, internal rotation, shortening	All of the above and destruction of articular surface, reduction in joint space
IV Stage of advanced arthritis	Flexion, adduction, internal rotation with gross shortening	Complete destruction, no joint space, wandering acetabulum

Source: Babhulkar and Pande, Clin Ortho Rel Res 2002

Preoperative evaluation

All Patients were evaluated with preoperative history, clinical examination and plain radiographs. Patients with unilateral stage Patients with unilateral stage II, III and IV hip tuberculosis were selected on regular antituberculosis treatment for more than 4 weeks before surgery, Comprehensive laboratory examinations was finished before surgery, including blood routine examination, tuberculosis T-SPOT examination, erythrocyte sedimentation rate (ESR), C-reactive protein (CRP) and other routine examinations. The antituberculosis drugs were as follows: isoniazid 5 mg (kg), rifampicin 450-600 mg/D, ethambutol 15 mg (kg), and pyrazinamide 15-30 mg (kg). Blood routine, liver and kidney function, ESR and CRP were reviewed weekly during antituberculosis chemotherapy. One-stage THA was performed when the ESR level decreased significantly or less than 40 mm/h.

Operative technique

Patients were operated under spinal anesthesia and under prophylactic antibiotics cover. Patient laid in affected lateral decubitus position. The patient needs to be sterile draped. Using skin marking pencil, extensile exposure over posterior aspect of hip incision given. Extending the incision distally to the centre of the greater trochanter and along the course of the femoral shaft. Dissecting the subcutaneous tissues from fascial plane, dividing fascia in line with skin and opening of

space between piriformis muscle, gluteus minimus and up to posterior wall of trochanter. All the rotators and capsules are lifted of the bone as a single. Inserting the Charnley retractor beneath fascia Lata. The dislocation of hip is done by flexing, adducting and gently internally rotation the hip. Placing a bone hook beneath the femoral neck at the level of lesser trochanter, lifting head gently out of acetabulum.

After complete curettage of cystic lesion and resection of the infected tissue, samples were sent for microbiological examination including AFB Staining and histological examination. Defects of acetabulum wall done with Impacting morselized bone graft from femoral head.

Trial Acetabular component placed before final implant selection, adequacy of fit, positioning and bony coverage. With the help of positioning device, system instrumentation acetabular cup is attached, and screw inserted for ancillary fixation. Insertion of polyethylene liner and preventing soft tissue interposing between liner and its metal.

Point of entry selected posterolateral to piriformis fossa, avoiding varus and under sizing. Broaching continues to achieve stability and ensures cancellous bone preservation.

Placing the calcar planer onto the broach stud mill the calcar to the broach face, allowing the implant collar to seat flush against the collar. Trial neck segment and trial modular heads assess proper component position, joint stability, range of motion and leg length.



Fig 1: Case of TB hip left side treated with total hip replacement with clinical photo at 6 months follow up

Proper Irrigating, cleaning and drying the prosthesis ensuring the taper is free of debris. Placement of appropriate femoral head onto the taper and lightly tap using head impactor before reduction of hip.

After reduction of the hip proceeding with repair of posterior soft tissue envelope, posterior capsule, repair of gluteus maximus, quadratus femoris which was divided. Placing closed suction drain deep to the fascia and loosely approximate the subcutaneous layer with absorbable sutures. Closure of the skin is done.

Follow up protocol

All patients were regularly followed up in 1, 3, 6 month(s)

and then annually after the operation thereafter.

Results

At every follow up, clinico-radiological assessment with functional outcomes were evaluated. Clinically, range of motion (by goniometer) and visual pain analogue score and hip harris score were assessed, while radiologically, X-rays of the bilateral hip joint. Functional Outcomes were measured by Hip Harris Score on every follow up.

The follow up ranged from 3-6 months. at last follow ups there was significant improvement in hip harris score with mean of 87 and visual analogue pain scale of 0, with full range of motion at hip joint.

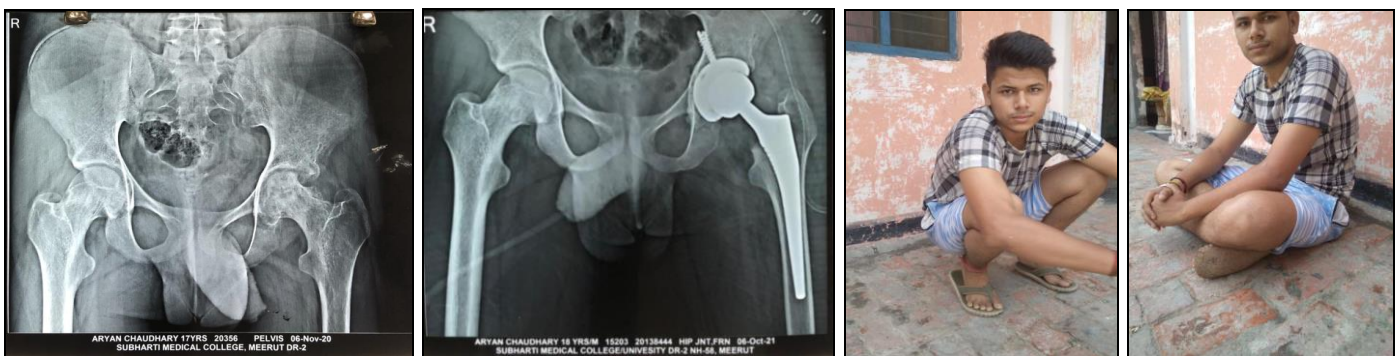


Fig 2: Case of TB hip left side treated with total hip replacement with 6 month follow up photos.

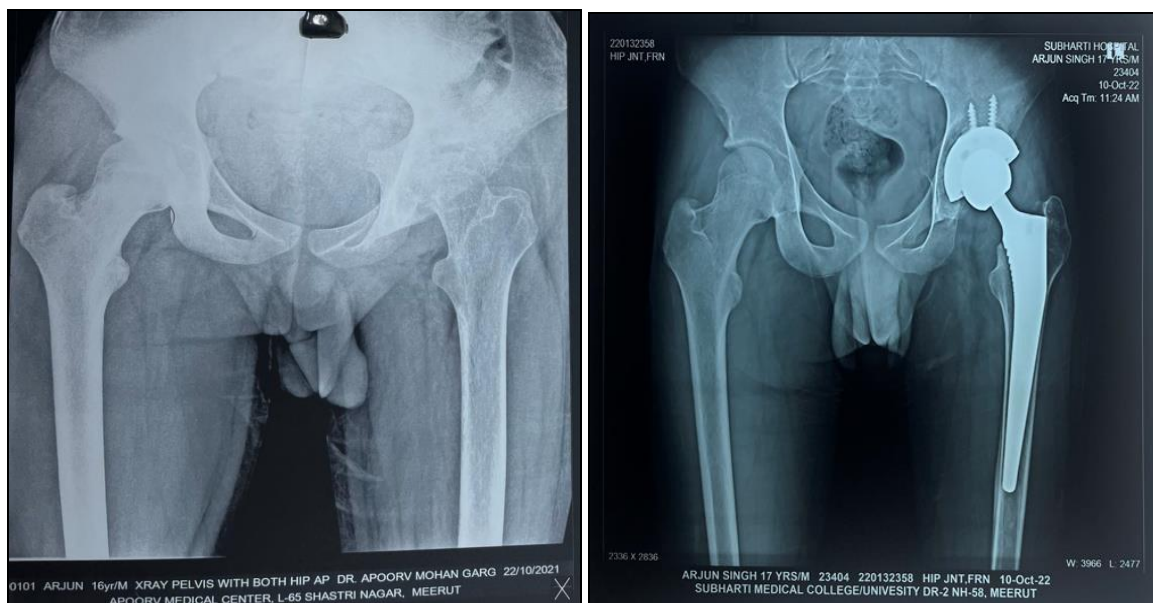


Fig 3: Pre and immediate post- operative x-rays



Post-operative x-rays

Fig 4: Pre-operative Clinical Photo

Discussion

In order to get the outcome of the total hip replacement amidst the patient who suffers from the tuberculosis of hip, the mean and standard deviation got calculated for calculating the quantitative data and for the qualitative data frequency and percentage in order to find out the association admits the categorical variables the Fisher’s Exact Test or the Chi-square test has been used for identifying the association between the categorical variables and for comparing the mean ANOVA or Independent T-Test got used, where 5% has been considered as the significant level.

While identifying the frequency distribution of the gender we observe that out of 15 cases majority of them were male which accounted for 80% and only 3 of them were females and the male to female ratio came up to be 12:3.

In accordance with this result some previous researchers like Thanh *et al.*, have noticed that in their study as well, that the males were the one who mainly suffered from arthritis that was followed by the tuberculosis of the hip. On the other hand, researchers like Hugate *et al.*, didn't find any such noticeable differences between male and female sufferers [5, 6]. The frequency distribution in VAS score to the radiological Grade came up with the results where majority of the subjects were found to be present in grade 3 which account for 66.7% that was followed by 20% in Grade 2 and lastly 13.3% were found to be in grade 4. Like these results the researchers Marmor *et al.*, had noticed that most of the cases, which was

around 59% fell under the grade 3 of their study as well [7].

At the time of admission to surgery the mean distribution of age and time show that the mean value of the age of the cases was 37.40 along with a standard deviation of 11.86 and the minimum value was 18 whereas the maximum value was 52. The mean value of the time duration at the time of admission to the surgery was 4.27 along with a standard deviation of 2.19 where the minimum value was 2 and the maximum value was 10. The results of Moon *et al.*, also showed some similar kind of results in their study regarding the age and time during the time of admission for surgery [8].

Moving on to the mean distribution of the VAS regarding the pain score, it has been noticed that the mean value at a time of preoperative assessment was 8.67 and the pain score reduced consistently with the passing of time. At the 1st month the pain score got reduced to 5.93, at the 3rd month it became 3.07 where is at the 6 month the pain came up with a value of 0.0 which was null.

The researchers Wang *et al.*, had noticed a decrease in the mean VAS score which was 7.6 preoperatively that lowered down to 1.4 during the final follow up period. The Hip Harris score changed from 42.2 which was during the pre-operative lowered to 25.4 at the time of the final follow-up period. There were no signs for reactivation that got detected. Even for all their patients the levels of CRP as well as ESR were within normal limits by the third and fourth month respectively [9].

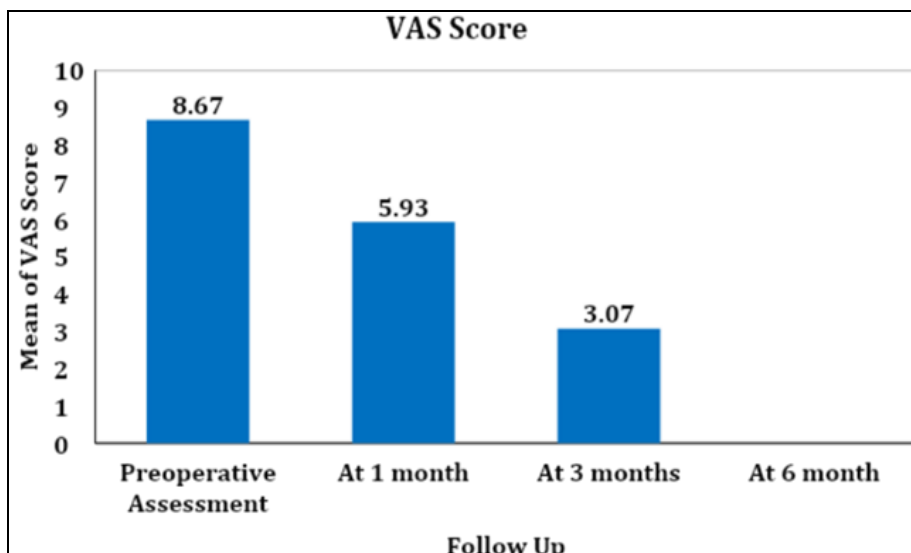


Fig 5: Comparison of mean vas score at the follow-up

During the follow-up period, a consistent improvement in the Hip Harris score was noticed where during the preoperative assessment the mean value was 33.47 which increased to 53.80 in the 1st month, 64.33 at the 3rd month and 87.93 at the 6th month. Such improvements in the Hip Harris score were also noticed by researchers like McCullough, where in the beginning before the treatment it was 36.83 that got increased to 85.29 at the end of 6 months of follow up period in their study^[10].

The comparison across the mean VAS score in this study was 8.40 for the lower bound whereas it was 8.94 for the upper bound. The mean values of the lower bound when not is to be 5.54, 2.53 and 0.00 at the end of the 1st month, 3rd month and 4th month respectively. On the other hand, the mean values of the upper bound were noticed at 6.32, 3.61, 0.00 at the end of

1st month, 3rd month and 4th month respectively. While using Repeated Measure ANOVA Test, for calculating the comparison between the 95% confidence interval for mean value between the lower bound and upper bound the P value came up to be statistically significant with 0.01. Similarly, the study of Eskola *et al.*, had also observed a very statistically significant value regarding the 95% confidence interval across the mean values^[11].

The following table in this study brought up the comparison between the mean values of the intra group that show the comparison in the mean VAS Score that was done by using the Post Hoc Tests that came up with a significant P value of 0.001 for all the segments which proved that it was statistically significant.

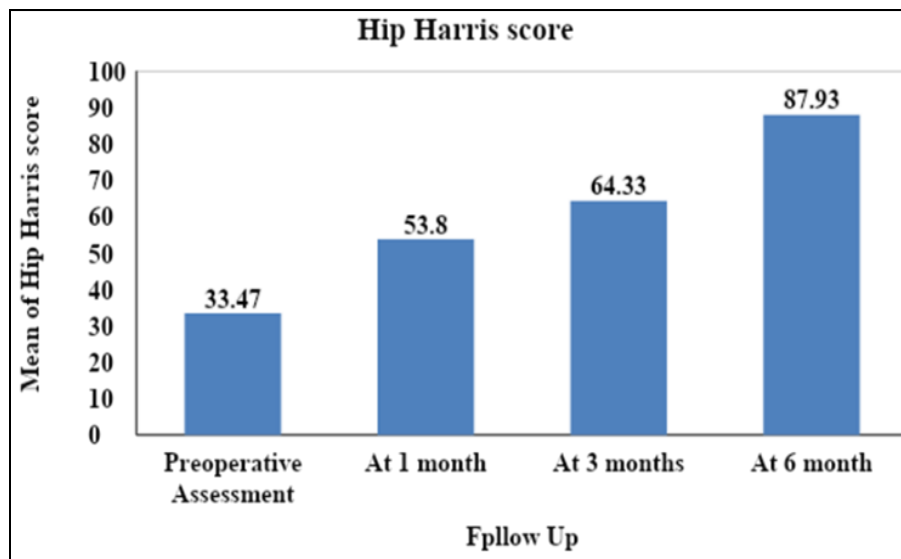


Fig 6: Comparison of mean hip harris score at the follow-up

Even the comparison of the VAS scores that was carried out by researchers like Kreder *et al.*, have found a development in the VAS score as well and even the P value came up to be significant with less than 0.05 in their study^[12].

The FIG 4 of this paper has carried out the comparison of the mean values of the Hip Harris score that shows that the mean value which was 33.5 at the preoperative assessment, got developed to 53.8 at 1st month, then 64.3 at the 2nd month and 87.9 at the 3rd month. The P value that was carried out with the of 95% confidence interval for mean shows 0.001, so it is statistically significant. The researchers Su *et al.*, had noticed some similar results as well^[13].

It can also be analyzed with the results received by Bi *et al.*, As per their histopathological examination that the hip range motion was improved 27.08 degrees and there was a significant increase in the Hip Harris score as well that has significantly risen to 88.00 mean value^[14].

At the end, the comparison of the mean Hip Harris score across the intra group, in this study has shown that the values of preoperative assessment have come up with values like -20.333, -30.867 and -54.467 at the 1st month, 3rd month and 4th month respectively. P value came up to be significant statistically with 0.001. The comparison of the Intra group during the 1 month came up with values of -54.467 and -34.133 and at the 3 month it had values of -23.600. For both the P value was significant since it came as 0.001 which is less than 0.05.

Despite having some limitations like a small number of cases and being a time bound study, have tried our best to bring out

the proper results so that it can be helpful for future researchers as well.

Conclusion

Finally, it can be concluded from the study that total hip replacement for arthritis following the tuberculosis of the hip acts as a proper method for the patients who suffer from tuberculosis and restores them back to a good function that helps them to get back to their daily life. But a proper intra-operative work-up is also very much necessary for ruling out if any residual diseases are left, with proper follow-up of the patient to identify if there is any recurrence. Sometimes a chance for recurrence remains during the first-year post completion of the surgery despite complete resolution of the radiological sign. But that can be taken care of with the help advanced antitubercular regimen therapy.

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