

Uncemented Total Hip Arthroplasty For Osteonecrosis of The Femoral Head in Late Diagnosed Developmental Dysplasia of The Hip: A Case Report

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Abstract

Background: Osteonecrosis of the femoral head (ONFH) is a disease in which local death of osteocytes and the component of the bone marrow occurs owing to venous stasis or arterial blood supply damage or interruption in the femoral head. Developmental dysplasia of the hip (DDH) is characterized by an abnormal anatomical relationship between the femoral head and acetabulum, and includes acetabular dysplasia, subluxation and in the most severe cases, development dislocation of the hip joint. Total Hip Arthroplasty (THA) is among the most successful orthopedic procedures worldwide. For acute and chronic hip diseases, THA can relieve joint pain, correct deformities, and restore and improve hip function. This study aims to understand the efficacy of Uncemented Total Hip Arthroplasty as the treatment of choice for osteonecrosis of the femoral head and late diagnosed developmental dysplasia of the hip in young adult patient.

Case Report: We present a case of osteonecrosis of the femoral head and late diagnosed developmental dysplasia of the hip in a 32 years old active male. He had a history of falling trauma from a height of about 1.5 meters at the age of 12 years (20 years ago), and at that period the patient was diagnosed with right femoral head fracture and had a special condition, namely developmental dysplasia of the hip, since that incident the patient had not been looking for any treatment and was unable to walk normally and always had a limping gait. Uncemented Total Hip Replacement procedure is chosen and performed successfully with good outcomes within 16 weeks after the procedure.

Discussion: Uncemented and cemented replacement had satisfactory long-term survival but they differed in their modes of failure. Patients who undergo total hip arthroplasty for osteonecrosis of the femoral head are younger and more active compared to those with osteoarthritis, showing a high likelihood of future revision procedures. Therefore, cementless applications is more appropriate alternative in young adult patient with osteonecrosis of femoral head.

Conclusion: Uncemented Total Hip Arthroplasty in young adult male patients with osteonecrosis of the femoral head and late diagnosis of DDH is a suitable option and has a high level of the functional effectiveness and good material durability.

Keywords: Osteonecrosis of femoral head, Total Hip Arthroplasty, Developmental dysplasia of the hip, Uncemented Total Hip Replacement, Cemented Total Hip Replacement

Introduction

Osteonecrosis of the femoral head (ONFH) is a devastating condition affecting patients in the 3rd-5th decades of life that usually progresses to femoral head collapse, often leading to total hip arthroplasty.¹ On definition, Osteonecrosis of the femoral head is a disease in which local death

of osteocytes and the component of the bone marrow occurs owing to venous stasis or arterial blood supply damage or interruption in the femoral head; the subsequent repair process attempts to heal the necrotic area, but structural deterioration and collapse of the femoral head causes pain and dysfunction of the hip joint.²

The aetiology and high risk population of ONFH can be divided into two major categories, traumatic and nontraumatic. The main aetiological factors for traumatic ONFH include femoral head and neck fracture, acetabular fracture, hip dislocation, and severe hip sprain or contusion (no fracture, with intraarticular haematoma).³ The main causes of nontraumatic ONFH are use of corticosteroids, chronic alcohol overconsumption, decompression sickness, haemoglobin diseases, autoimmune diseases, and idiopathic diseases.⁴ Smoking and obesity increase the risk of OFNH and are considered to be correlated with ONFH.⁵

Developmental dysplasia of the hip is a gradually progressive disease of the hip joint in children, that is characterized by an abnormal anatomical relationship between the femoral head and acetabulum, and includes acetabular dysplasia, subluxation and in the most severe cases, development dislocation of the hip joint.⁶

The social and economic cost associated with osteonecrosis of the femoral head can be significant for an individual. Though, various treatment options have been tried in the past and few therapies are at current research stage, it is pertinent to state that definitive treatment of avascular necrosis of the femoral head is Total Hip Replacement as evidenced by empirical studies till date.⁷ Total Hip Arthroplasty (THA) is among the most successful orthopedic procedures worldwide. For acute and chronic hip diseases, THA can relieve joint pain, correct deformities, and restore and improve hip function.⁸

This study aims to understand the efficacy of Uncemented Total Hip Arthroplasty as the treatment of choice for osteonecrosis of the femoral head and late diagnosed developmental dysplasia of the hip in young adult patient.

Case Report

A 32-year-old male was admitted to our ER with a prolonged excruciating pain localized in the right hip which had worsened since a week ago, causing the patient to be unable to walk at all.

The patient had a history of falling trauma from a height of about 1.5 meters at the age of 12 years (20 years ago), and at that same period the patient was diagnosed with right femoral head fracture and had a special condition, namely developmental dysplasia of the hip. Since that incident the patient had not been looking for any treatment and was unable to walk normally and always limping. The patient has no history of any systemic diseases, corticosteroid usage or alcoholism.

The primary survey that has been carried out did not find a major trauma and the patient was declared stable. On the local examination of both hip joints, there is a clear leg length discrepancy where the right lower extremity is shorter (3.5 cm) than the left one. On palpitation, tenderness was found to be most dominant on the right buttocks. Femoral Pulsation and distal pulsation are not interrupted. Both active and passive range of movement of the right hip joint is very restricted and painful (VAS score = 9). Neurologic examination and knee joint stability is within normal limits.

Radiographic imaging of plain x-ray is done to evaluate both of the hip joint (Figure 1). From radiological findings, it is clear that there is a loss of sphericity of the right femoral head (flattening >30% with joint depression) and acetabular roof with early stage of progressive secondary degenerative changes (stage IV, Arlet and Ficat Classification). The acetabular roof looks dysplastic and shallow on both sides of the hip with weight-bearing forces distributed over a smaller surface on the right hip.



Figure 1: Plain radiograph showing late stage of osteonecrosis of the right femoral head

During surgical exploration, femoral head removal is less difficult due to the collapsed femoral head and fibrosis capsule with contracture muscle, however measuring the diameter of the femoral head component becomes more difficult, and repeated trials of the femoral head prosthesis within the acetabulum are required. Furthermore, the procedure is carried out according to the

procedural stages of Cementless Total Hip Arthroplasty with Acetabular screw was added on the procedure (Figure 2). At the end of the procedure, the correct rotational alignment and stability of both acetabular and femoral components are ensured, and also the length of both legs are equal.

To reduce the risk of prosthetic hip dislocation during the first 6 weeks, the patient should avoid certain leg positions which are adduction across the midline, hip flexion of more than 80 to 90, and internal rotation.



Figure 2: Plain radiograph showing Uncemented Total Hip Arthroplasty with acetabular screw placed within acceptable position

There are no postoperative complications. Physical therapy of partial weight-bearing with the help of a walker has been gradually scheduled, with regular monitoring every 4-6 week intervals. During the monitoring interval and prohibition of adduction and internal rotation of the hip, no significant complications were found. In the first 6 weeks, the patient was able to return to full weight-bearing and slowly walking with a walker. Finally, after 16 weeks, the patient was able to return to normal activities.

Discussion

Most theories point towards an alteration in the intravascular blood flow as the potential mechanism of Osteonecrosis initiation. These alterations may occur either from a traumatic or a non-traumatic cause or be a consequence of some well-accepted risk factors. Trauma leads to ONFH by mechanically disrupting the vascular supply to the femoral head. This occurs when the main blood supply to the adult femoral head (medial circumflex femoral artery or MCFA) is disrupted due to a femoral head fracture, displaced femoral neck fracture, or hip dislocation.⁹ As previously mentioned, the patient had a history of untreated femoral head fracture.

Theoretically, any case of DDH not diagnosed at the neonatal screening examination is a late diagnosis. Interpretation and comparison of the reported rates of late diagnosed DDH is often difficult because of differences in definition and cut-off age at diagnosis used in different studies. However, for practical purposes, it can be assumed that a delay in diagnosis and treatment in excess of 3 months would have a deleterious effect on the outcome in terms of irreversible damage to the cartilaginous acetabulum resulting in varying degrees of acetabular dysplasia and the requirement for more invasive treatment.¹⁰

As OFNH is an evolving disease, its diagnosing may need different radiological modalities, which range from standard radiograph, MRI and CT to radionuclide examinations. Radiolucency, sclerosis or bone resorption are best seen on MRI and CT whereas degenerative changes due to collapse are easily seen on plain films (as we found in this case). Still, CT scans show the necrotic changes in more advanced stages and are less sensitive than MRI for early stages.¹¹

Joint replacement should be selected in cases in which the femoral head is significantly collapsed, late stage arterial occlusion features are present, and severe joint function loss or moderate/severe pain is present.² On this patient the femoral head had been significantly collapsed, and also the patient was unable to walk which indicates a severe joint function loss, followed by pain with a vas score of 9, indicating a severe pain is present.

Both uncemented and cemented replacement had satisfactory long-term survival but they differed in their modes of failure. Uncemented stem were most often revised early due to infection and dislocation, whereas cemented stems were mostly revised later due to aseptic loosening.¹² Patients who undergo total hip arthroplasty for avascular necrosis of the femoral head are younger and more active compared to those with osteoarthritis, showing a high likelihood of future revision procedures.¹³ Therefore, cementless applications is more appropriate alternative in this patient (Figure 3).

In THA, doubts remain as to whether the press-fit acetabular component should be fixed with screws. Additional screws may damage important nerves and blood vessels, and wear of the screws may lead to osteolysis, but currently limited evidence shows that the use of screws during THA may not improve cup stability.¹⁴

In the present study, cementless stem subsidence was significantly higher in the group full weight-bearing with enhanced recovery rehabilitation compared to partial weight-bearing.¹⁵ This patient was advised to undergo rehabilitation initially by partial weight-bearing

with a walker to minimize the incidence of stem subsidence.

Conclusion

Uncemented Total Hip Arthroplasty with acetabular screw in young adult male patients with osteonecrosis of the femoral head and late diagnosis of DDH is a suitable option and has a high level of the functional effectiveness and good material durability.

Good knowledge of preoperative, intraoperative, postoperative evaluation conditions, as well as routine monitoring of the rehabilitation program are the keys to a good outcome in this case.

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