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A Case Report: Supercapsular Percutaneous Assisted Total Hip (SuperPATH) in a Patient with Spastic Cerebral Palsy and Dysplastic Hip

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Abstract

Introduction: Patients with neuromuscular disorder such as cerebral palsy often develop painful degenerative hip arthritis that can affect the quality of life and function. Total hip replacement is the treatment of choice. However, due to higher rate of dislocation and early wear, this procedure remains controversial. Supercapsular Percutaneous Assisted Total Hip (SuperPATH) is a relatively new Minimally Invasive Surgical (MIS) technique with low dislocation rate.

Case Report: A 31-year-old female who was diagnosed with spastic dyplasia cerebral palsy with arthritic left hip secondary to dysplastic hip. We performed SuperPATH. At 1 year post operative, patient can independently walk without any assistive devices with marked improvement on

the Harris Hip Score.

Discussion: Muscle imbalance in patient with cerebral palsy often leads to hip instability which resulting an arthritic hip. THA procedure remains controversy to treat the hip arthrosis due to its complications. However, the development of MIS such as SuperPATH which preserves the external rotators reduced the risk of dislocation significantly.

Conclusion: THA is controversy procedure in treating hip arthrosis in cerebral palsy patient due to the high risk of dislocation. But with the development of MIS such as SuperPATH, THA can be the treatment of choice with favorable outcomes.

Keywords: Dysplastic Hip, Spastic Cerebral Palsy, SuperPATH

Introduction

Cerebral palsy is one of the neuromuscular condition which often lead to painful hip degeneration, subluxation or dislocation as the result of muscle imbalance ^[1]. The soft tissue contracture leading to increase femoral anteversion, acetabular index and coxa valga ^[1, 2]. A 2.6-28% hip subluxation/dislocation has been reported, which higher in severe total body involvement. Surgical options for the end stage arthritis include resection arthroplasty, arthrodesis or total hip arthroplasty.

Total hip arthroplasty (THA) commonly becomes the treatment of choice over the arthrodesis and resection arthroplasty. However, due to muscle imbalance, the concerns for dislocation, aseptic loosening, and other complication has raised controversy ^[1].

Recently, with the development of minimally invasive surgery (MIS), an initial experience of supercapsular percutaneously assisted total hip (superPATH) was reported by Chow *et al.* The hip is prepared in-situ to allow the operative leg rest on a Mayo stand. A small window created in the interval of gluteus medius and piriformis. No hip dislocation done during this procedure. The accessory portal provides in-line access to the cup, insertion of screws, and impaction of bone-ingrowth components ^[3]. This technique does not require any cojoint tendon or external rotator muscles release. Majority of cases, piriformis can be preserved. With the less soft tissue damage, it reduces the likelihood of dislocation.

We report a case of spastic dyplastic cerebral palsy with degenerative osteoarthritis secondary to dysplastic hip left. Patient underwent total hip arthroplasty using superPATH technique. At 1 year post op, patient walks independently without hip pain and dislocation. Here we report our case with a review of literature.

Case Presentation

A 31-year-old female with the diagnosis of spastic dyplastic cerebral palsy consulted to our institution due to intractable left hip pain for 2 years (2016-2018). She underwent adductor tenotomy and partial iliopsoas release in February 2017 in other institution. Physical therapy was done. But showed no improvement of symptom.

Patient came in with 8/10 VAS (The Visual Analogue Scale) over the left hip and Harris Hip Score was 37. We diagnosed the patient with left hip osteoarthritis secondary to dysplastic hip with spastic cerebral palsy. On physical

examination we noted hip flexion and adduction contracture, as well as the bilateral fixed equinovagis feet deformity. The clinical leg length discrepancy was 1 cm compare to the other side.

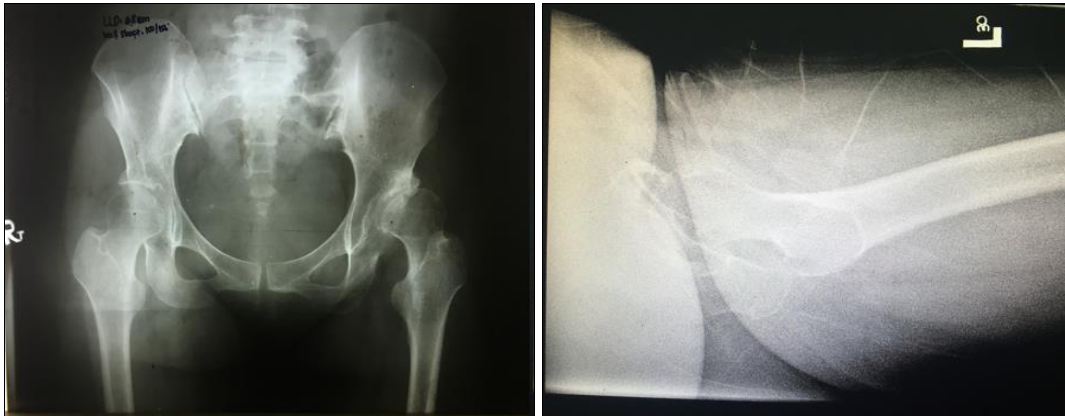


Fig 1: Pre-op anteroposterior (AP) pelvis (a) and left cross table hip view (b) Xrays showing a coxa valga with dysplastic hip left. Femoral head subluxation was 50% with CEA 5° and abduction angle 48°

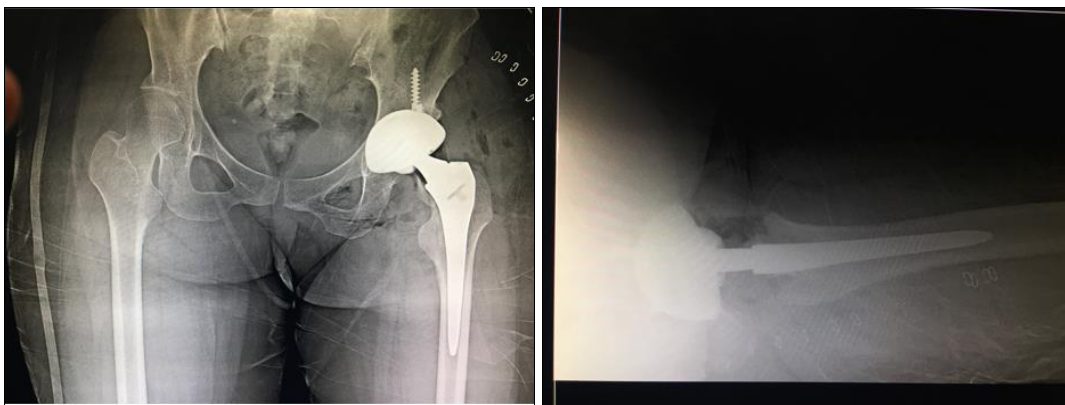


Fig 2: Immediate post-operative Xrays following total hip replacement. (a) Pelvis AP view showing a 30° acetabular inclination, (b) cross table hip view showing a 28° anteversion

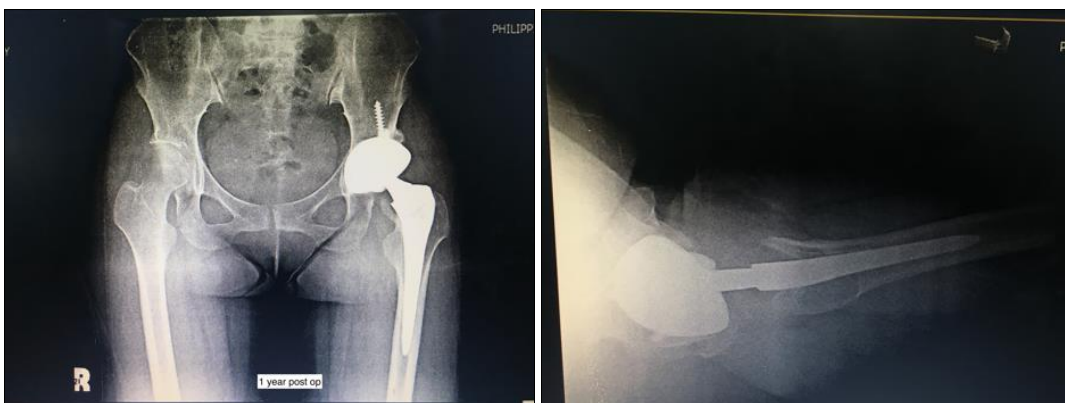


Fig 3: (a) AP pelvis at 1 year post operative, and left cross table hip view Xrays showing implants were in place with no signs of dislocation or loosening

A total hip arthroplasty on the left was planned. The preoperative anteroposterior (AP) pelvis x-ray showed a coxa valga with the neck shaft angle 150° on the right and 156° on the left. The center edge angle was 5°, abduction angle of 48°, 50% femoral head subluxation, and 0.8cm leg length discrepancy (Fig. 1).

Total hip arthroplasty then performed through a superPATH technique. Intraoperatively, the only external rotator which detached was piriformis tendon due to the significant

tightness. A size of 46mm cementless porous-coated acetabular cup was used. It was placed more horizontally with 30° acetabular inclination and 28° anteversion. Ceramic on ceramic on articular bearing were used. And a size of 2 cementless stem with modular neck inserted. The anterior capsule was remained intact (Fig. 2).

Postoperatively, posterior hip dislocation precautions were emphasized. A muscle relaxant (Baclofen) also given. Patient was able to walk with walker at day 2 postoperative

with minimal pain on surgical site. We noted that the hip was in adducted position despite the muscle relaxant which was started postoperatively. Patient was discharged 1 week after surgery with the dislocation precautions.

At 2 weeks follow up, patient did not report any pain but we noted the hip still on flexion and adduction, despite of the muscle relaxant that patient had been taken. At this time the Harris Hip Score was improving to 43. The implants were in place without any radiographic signs of dislocation.

At 1 month postoperative, patient claimed that she was able to attend the school activity as a teacher with tolerable pain on her hip.

At the latest follow up (1 year postoperative), patient was completely pain free with 0.5 cm leg length discrepancy. Pelvic x-ray showed the implants were in place without any signs of dislocation or loosening (Fig. 3). Patient was able to walk independently without any assistive device. The Harris Hip Score was 88.

Discussion

The main reason for hip instability in patient with cerebral palsy is due to muscle imbalance between strong hip flexors and adductors and weak hip extensors and abductors^[1]. This often leads to hip dislocation or subluxation which resulting of an arthritic joint. THA is the one of the most successful treatment for treating end stage arthritis^[2]. The first THA was performed 1971 in patient with CP. But due to the lack of long term follow up and the risk of complications such as dislocation and early loosening, THA then become controversy^[7].

With the development of MIS, a study done by Dorr *et al*, showed that there is significant improvement in terms of pain relief and length of hospital stay compare to conventional total hip approach^[4]. Another study by other authors showed that superPATH approach has decrease blood loss and significant higher hip harris score compare to conventional posterior hip approach^[6]. Due to the preservation of the external rotators, the risk of posterior dislocation also reduced, from 6.2 to 1.8%^[5]. The degree of satisfaction of the patients was noted to be 77-93% after THA, pain relief was obtained in all patients^[8,9,10].

Despite of the physical therapy and muscle relaxant that had been given to the patient, we noted that there is persistent of hip flexion and adduction contracture. This is due to the muscle imbalance which involves upper motor neuron or cortex of the brain. But the harris hip score was markedly improving from 38 preoperatively to 43 at 2 weeks post op, to 57 at 1 month post op, and finally to 88 at 1 year post op. This case report is limited by the lack of long-term follow up. The functional outcome was only measured one-year post-op.

Conclusion

Although THA is controversy procedure in treating of hip arthrosis in cerebral palsy patient, it is also a successful procedure and gives a high degree of satisfaction compare to the other surgical options such as hip arthrodesis or resection arthroplasty.

With the development of MIS, preservation of external rotators and proper placement of acetabulum and femoral component, THA can be the treatment of choice for the patient. In this case, a superPATH was performed with favorable outcomes, and no complication after one year of follow up.

Declarations

Conflict of Interest

The authors declare no conflicts of interest.

Acknowledgement

None.

Disclosure

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Consent for Publication

Patient gave informed consent for further use of data on our institutional consent form.

Author Contributions

Conceptualization, Musa and Baron; methodology, Musa and Baron; software, Musa and Baron; formal analysis, Baron; investigation, Musa; resources, Musa; data curatio, Musa and Baron; writing — original draft preparation Musa; writing — review and editing, Musa; visualization Musa and Baron; supervision Baron; project administration, Musa; funding acquisition, Musa. All authors have read and agreed to the published version of the manuscript.

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