

Smith-Petersen Mould Arthroplasty: a 48-year Follow-up

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ABSTRACT

We present the longest follow-up of a Smith-Petersen mould arthroplasty ever to be reported in Thailand. The patient was pain-free for 47 years after the surgery and eventually required the revision. There was neither osteolysis nor soft tissue reaction to a Vitallium cup after its long usage.

Keywords: Mould arthroplasty, revision total hip arthroplasty

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INTRODUCTION

The interpositional hip arthroplasty was firstly performed to alleviate hip pain in France during the 1880s by Ollier, who used periarticular soft tissues to resurface the joint. However, a significant advance came in 1923 when Smith-Petersen used a glass cup to cover the reshaped head of the femur.¹ Subsequently, he employed a number of different materials and finally a cobalt-chromium alloy called Vitallium (1938) with increased durability and less tissue reaction (Fig 1). The principle of this type of arthroplasty is to allow motion between the acetabulum-prostheses-femoral head. However, the major problem with this design is the cup instability. Many literatures reported the early failure, but some published more than 20-year survivorship.²⁻⁵ Currently,



Fig 1. A Smith-Petersen mould arthroplasty.

we report a Smith-Petersen mould arthroplasty which has been in place for 48 years.

CASE REPORT

In December 2011, a 60-year-old housewife came to our institute due to the pain in her left groin, which had caused her a limp for almost a year. Prior to that she was able to walk without aids. The pain gradually worsened with time, especially after a long walk. She felt relief after resting and did not report any night pain. She walked with an antalgic gait. The left leg was 2.5 centimeters shorter than the right. The physical examination of her left hip revealed a longitudinal surgical scar about 18 centimeters on the anterolateral aspect of the hip. The range-of-motion arc was 90° of flexion, 30° of abduction, 10° of adduction, 10° of internal rotation, and 40° of external rotation. Her WOMAC score was 20, and the Harris hip score was 46. The trendelenburg test was positive. Her erythrocyte sedimentation rate and c-reactive protein level were in normal ranges.

The radiographs showed a Smith-Petersen mould arthroplasty, which was in a varus position on her left femoral head. The cup was dislocated posterosuperiorly. There was also a medial osteophyte in the acetabulum. The bone on her left hip was smaller and more osteoporotic than the other hip, but no osteolysis was demonstrated (Fig 2A). She mentioned that she underwent the hip surgery 48 years ago due to a painful hip from the development at hip dysplasia. Ironically, the operation was also performed at our institute. After that surgery she could walk well and returned to normal living without pain, although, she had been lost to follow-up since then.

The senior author (PU) decided to revise the mould arthroplasty in order to relieve her symptom and restore the leg length. The plan was to approach the hip posteriorly. During the surgery, it was found that her Vitallium

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Fig 2A. Radiograph showed a Smith-Petersen mould arthroplasty after 48 years of implantation.

cup was dislocated posteriorly and had destroyed all her posterior acetabular wall and posterior aspect of the roof. The cup was not mobile around the femoral head because of the overgrown osteophyte at the base of the femoral head. However, after the removal of the osteophyte, the cup was able to move freely. There were some scratches on the surface of the cup. The interesting gross finding was that there was absolutely neither osteolysis nor soft tissue reaction such as metallosis or granuloma around the mould arthroplasty which was unlike the situation that frequently found during the revision of the contemporary hip prosthesis. However, there was not any tissue sampling for pathologic examination.

After the cup removal, we found that the underlying femoral head was covered with fibrous tissue. It was still in a good configuration although it was soft (Fig 2B). The medial osteophyte in the acetabulum was then removed and the defect (mostly the posterior wall) was corrected with the trabecular metal augment and prepared for a cementless cup. The femoral side was revised with a fully hydroxyapatite-coated stem. We selected the metal-on-highly cross-linked polyethylene for the bearing

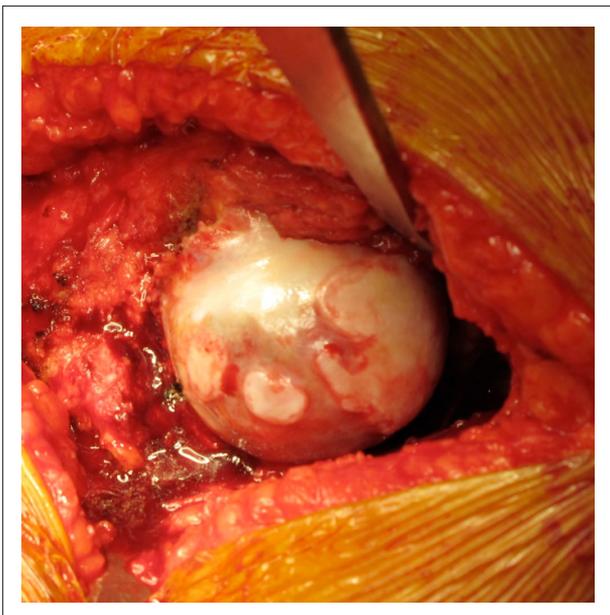


Fig 2B. The condition of a femoral head after the cup removal.



Fig 2C. Post-revision radiograph.

surface (Fig 2C). After the revision surgery, the patient experienced great pain relief and an equal leg length. She was satisfied with the operation. At the latest follow up (8 weeks after the surgery), her range-of-motion arc was 100° of flexion, 40° of abduction, 20° of adduction, 20° of internal rotation, and 40° of external rotation. Her WOMAC score was 7, and her Harris hip score was 86.

DISCUSSION

A Smith-Petersen mould arthroplasty was the original design of the current hip resurfacing.¹ Since its introduction, it was stated that the new era of arthroplasty had begun. It was intended to be used as an interpositional arthroplasty therefore no fixation should happen between the cup and the femoral head. However, because of the major complication of cup instability, the following designs introduced the stem and cement fixation to the implant. It was widely used as a standard treatment for hip pain until the advent of Sir John Charnley's low friction arthroplasty in the 1960s.

There have been some reports on long-term follow-up of mould arthroplasty. Baker et al, published the longest follow-up at 62 years.² Our case, however, is the longest follow-up ever to be reported in Thailand. The patient had been pain-free for 47 years after the index surgery although she was implanted at the age of only 12. Our intra-operative findings suggested the advantage of this implant in terms of no soft tissue and bony reaction to a Vitallium cup after its long use although the finding could be different in cases with an early failure. However, because the implant had no acetabular protection against the metal cup, it was shown in our patient that the failure was from the acetabular erosion which resulted in a cup dislocation.

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