Introduction

The cemented Thompson hemiarthroplasty has been used for displaced femoral neck fractures in elderly patients since its introduction in the 1950s. Its popularity has been fading in recent years as it is replaced by other types of hemiarthroplasty stems, bipolar prosthesis as well as total hip arthroplasty. Recent reports of better outcomes with total hip arthroplasty have also contributed to this reduction in use. A recent study compared reduction and internal fixation, bipolar hemiarthroplasty, and total hip arthroplasty in the treatment of displaced, intracapsular hip fractures in healthy, older patients. It showed that total hip arthroplasty was the most successful clinically and most cost-effective. Inevitable acetabular cartilage wear has also been reported by many authors as a cause of pain and ultimately conversion to total hip arthroplasty. When this prosthesis was first introduced by Dr. Frederick R. Thompson in 1951, the designer reported that the Vitallium prosthesis did not erode articular cartilage in cases with a preserved joint space at the time of implantation. He did, however, point out that sclerosis of the acetabulum and intrusion of the prosthesis into the soft acetabular bone could occur in the future. In this paper, we report on a Thompson hemiprosthesis which has remained asymptomatic after 44 years of unrestricted use. To our knowledge this is the longest successful follow up for a (Thompson) hip hemiarthroplasty in the literature. Our patient was informed that the data concerning this case will be submitted for publication.

Case report

The patient is a 65-year-old female who underwent staged bilateral Thompson hemiarthroplasties when she was in her early twenties due to bilateral avascular necrosis of the femoral heads. At 18 years of age, she had been diagnosed with systemic lupus erythematosus. Her first hemiprosthesis was placed in the left hip at age 21 (in 1963), and the second (right hip) in 1964, at the age of 22. After the procedures, she continued to work full-time as a social worker. She was initially referred to our clinic in 1980, 17 years after the index Thompson hemiarthroplasties. At that time, she had mild and occasional episodes of pain due to slight joint-space narrowing of the right acetabulum; she had no complaints related to her left hip. She was still functional, fully employed and managing well. A conservative approach was suggested, including use of a cane in her left hand, reduced activities, and salicylates for pain. The patient continued to do well with these conservative treatment modalities until 25 years after the right Thompson hemiarthroplasty (1989). At this point, she was still working as a social worker, but was not participating in any recreational activities and felt the pain was compromising her daily life. Due to this disabling pain, she underwent a right hip revision surgery with conversion to a total hip arthroplasty in 1989. She subsequently experi-
Discussion

We report a patient who had a very favorable clinical and radiological result after bilateral Thompson hemiarthroplasties implanted at a very young age. The right Thompson hemiprostheses survived 25 years and the left one is still serving the patient after 44 years of unrestricted lifestyle. Various studies in the literature have investigated the response of acetabular cartilage to metallic femoral heads; these studies showed early cartilage wear both macroscopically and histologically. Cruess et al. replaced the femoral heads of 26 dogs with Vitallium prostheses; These animals were sacrificed at 6 weeks intervals up to 24 weeks. They found gradual cartilage damage and after 24 weeks, no normal cartilage remained in any of the study dogs. Cook et al. implanted three types of replacement surfaces (low-temperature isotropic pyrolytic carbon, cobalt—chromium—molybdenum alloy, and titanium alloy) in 45 dogs, using the contralateral acetabulum as the control. The gross and histological appearance of all operated acetabulae exhibited progressive degeneration with time, but more severe changes were noted with the metallic surfaces than the carbon surface. In a study of 69 patients with a Thompson hemiarthroplasty Phillips et al. reported that the patient physical activity level and the duration of follow-up have the highest correlation with the severity of acetabular erosion. In addition, obesity was also reported as a factor in the development of acetabular erosion. Kwok et al. reviewed 599 patients with Moore and Thompson prostheses, assessing head size, neck length, stem-shaft angle, and calcar seating, and their relationship with the longevity of the hemiarthroplasty. The authors surmised that if too much femoral neck was removed, the leg would be short, leading to loose abductor musculature and possible dislocation. In contrast, leaving a longer neck may cause over-tightening of the periprosthetic soft tissues leading to increased stress across the hip joint, and resultant increased wear. In addition, inappropriate sizes may cause early cartilage wear: polar wear is expected with smaller diameter heads and equatorial wear with larger heads. A small head distributes all forces to a rather small area of articular cartilage within the acetabulum, while a larger head transmits all of the force initially at the entrance to the acetabulum.

There are few case reports of long-term follow-up of the hemiarthroplasty in the literature. Wolfson and Waddell reported a female patient who received a Moore hemiarthroplasty after failed pin fixation following traumatic femoral neck fracture. She enjoyed 32 years of unrestricted lifestyle after which the hip became progressively symptomatic and she underwent a conversion to total hip arthroplasty after 32 years. Recently, Kelley et al. reported on a young, fit postman with an asymptomatic Thompson hemiarthroplasty after 40 years of heavy normal use. Marchetti et al. reported a patient who received bilateral Moore prostheses for bilateral avascular necrosis of the femoral head and both hemiarthroplasties were intact after 35 years. The patient sustained a periprosthetic fracture (Vancouver B1) on the left side 35 years after the index surgery which was treated with plate and wire fixation because the prosthesis exhibited excellent acetabular cartilage tolerance and clinical condition, and showed no signs of loosening or osteolysis. These reports emphasized that poor results in hemiarthroplasty may not be related entirely to metal-on-cartilage articulation. Restoring hip anatomy with good abductor lever arm and appropriately sized femoral head must be a priority to achieve optimum results. Marchetti et al. noted the fact that Moore prosthesis does not have a polyethylene element prevented the development of osteolysis. Our patient had bilateral Thompson hemiprostheses with the right side converted to a total hip arthroplasty 25 years after the original surgery.

The Thompson prosthesis has several shortcomings for accurately restoring hip anatomy. There are no templates available to help predict an accurate neck cut. If a short neck remains after a displaced femoral neck fracture, this remain-
ing neck length would dictate the final neck length. There is only one neck size and no modularity, limiting options for adequate restoration of neck length and femoral offset. Lack of modularity of the Thompson prosthesis also leads to difficulties in adjusting the femoral offset and neck length.

References