Hip Hemiarthroplasty for Femoral Neck Fractures Using the Modified Stracathro Approach — Short Term Results in Twenty-six Patients

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ABSTRACT

Background and Objective: The Stracathro approach to the hip is a modification of the lateral approach, which was popularized by Hays and McLauchlan. It has a high safety profile and a low rate of hip dislocation. However, the need for osteotomy increases blood loss, risk of intraoperative fracture, and postoperative heterotopic calcification. In sub-Saharan Africa, where traditional healers dabble in the treatment of all musculoskeletal conditions, extensive soft tissue contractures and disuse osteoporosis arise and further complicate the lateral approach. The objective of this article is to highlight modifications made to the stracathro approach and present the short-term results in a group of 26 patients, who had hemiarthroplasty using this technique. **Materials and Methods:** All patients presenting with subcapital or transcervical fracture of the femoral neck after the age of 50 years were offered hemiarthroplasty using the modified Stracathro approach, with follow-ups for a period ranging from 28 – 84 months. **Results:** A majority (23 out of 26 – 88.5%) of patients presented late for the treatment, due to the patronage of traditional bonesetters. In spite of the soft tissue contractures and osteoporosis associated with late presentation, there was no case of intraoperative fractures. The patients had good hip abduction postoperatively. In addition, there was no intraoperative nerve or vascular injury. **Conclusion:** The short-term results in this group of patients showed that the modified Stracathro approach was safe and useful in hemiarthroplasty, for patients with soft tissue contracture and osteoporosis.

Key words: Femoral neck fractures, hip hemiarthroplasty, modified stracathro approach

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INTRODUCTION

The transgluteal approach splits the fibers of the gluteus medius and vastus lateralis across their common point of insertion and origin at the greater trochanter (GT). There are several approaches, with the main points of variation being the breadth of the gluteus medius and vastus lateralis complex reflected off the GT anteriorly, the orientation of the incision in the conjoint tendon of the gluteus medius and vastus lateralis, the reflection of the conjoint tendon with a slice of the GT by osteotomy, and the method of reattachment of the sleeve of the bone to its bed.[1]

One of the earliest descriptions of the gluteus medius and vastus lateralis splitting by the direct lateral approach to the hip was made by McFarland and Osborne, who observed that the gluteus medius and vastus lateralis were continuous across the greater trochanter where there was localized periosteal thickening.[1-3] In their technique, an oblique incision was made into the conjoint tendon from the posterior margin of the tendinous insertion of the gluteus medius along the greater trochanter to the lateral aspect of the tendinous origin of the vastus lateralis from the base of the GT, and the entire muscle mass was released from the greater trochanter with the help of a knife and osteotome. Retraction of the muscles anteriorly exposed the gluteus minimus, which was released from its insertion into the greater trochanter, to give access to the capsule of the hip joint.

Hardinge made a modification of this technique. He split the gluteus medius longitudinally and released only the anterior half of the muscle along with the corresponding anterior part of the vastus lateralis.[4] The Stracathro approach was described by McLauchlan. It entailed the use of an osteotome to raise the Osseo-tendinous flaps of the gluteus medius and vastus lateralis off the greater trochanter anteriorly and posteriorly, to expose the gluteus minimus.[5]

The extent of exposure in the direct lateral approach is significantly limited superiorly by the course of the superior gluteal nerve, which crosses the deep surface of the gluteus medius at about 5 cm above the tip of the greater trochanter,[6] and this creates a wide exposure beyond two inches above the greater trochanter, which may probably

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cause superior gluteal nerve injury. Bos *et al.*[7] advocates that dissection above the greater trochanter must be limited to 3 cm, because of variations in the exact course of the nerve. This suggests that a more extensive proximal dissection portends a higher risk of injury to the superior gluteal nerve during the lateral approach. In addition, because osteoporosis is a risk factor for intraoperative femoral fracture and a feature in our patients who frequently present late with associated soft tissue contractures, the need for an exposure that is wide, without increasing the risk of intraoperative complications, becomes apparent. Furthermore, oozing of blood from the exposed surface of the greater trochanter after osteotomy usually increases the overall blood loss at surgery and morbidity after surgery, which may be further aggravated by a fracture of the greater trochanter that will lead to a delay in the restoration of the function of the abductors. The modification of the Stracathro approach obviates these limitations and reduces the risk of an intraoperative fracture and suits the treatment of cases with hip contracture and disuse osteoporosis. Twenty-six patients have had hemiarthroplasty of the hip using the modified Stracathro approach following fracture of the neck of the femur and have been followed-up for between 28 and 84 months. The short term result of using the approach is hereby presented.

MATERIALS AND METHODS

All the patients who had hemiarthroplasty for femoral neck fracture done by the first author in the University of Benin Teaching Hospital, Irowa Medical Center, and Cenit Medical Center, all in Benin City, made up the cohort. All the operations were done via the modified stracathro approach between January 2002 and September 2006. Their clinical and demographic features were noted. They were followed up in the clinic to detect the occurrence of complications.

The modifications that were made in the Stracathro approach to the hip were: transverse relaxing incisions in both edges of the fascia lata, 2 cm below the lowest palpable part of the GT; blunt separation of the fibers of the gluteus medius above the greater trochanter with peanut swabs, to enable easy identification of the superior gluteal nerve; subperiosteal dissection of the anterior and the posterior halves of the conjoint tendon of the gluteus medius and vastus lateralis, away from the greater trochanter and along the intertrochanteric line, anteriorly.

Operative technique

Soap and water enema was administered on the evening of the day before the surgery to prevent fecal soiling that may follow loss of anal sphincter tone after epidural or spinal anesthesia. This was necessary to reduce the risk of infection in our setting, where impervious and adhesive sterile drapes are either non-available or irregular in supply. After anesthesia, usually epidural or spinal, the patient was placed supine with the ipsilateral greater trochanter at the edge of the operating table and a sandbag under the ipsilateral loin. Prophylactic antibiotics were given intravenously at the induction of anesthesia. The skin was cleaned from the toes to the ipsilateral half of the abdomen up to the level of the umbilicus with gauze swabs soaked in 5% chlorhexidine solution, followed by alcohol-soaked swabs, and then with swabs soaked in povidone-iodine. Large drapes were applied over the trunk and the contralateral limb, followed by small drapes. The ipsilateral limb was draped free with sterile leggings. Foundation drapes with sterile McIntosh were applied over the trunk and contralateral limb, to ensure that the wetness of the drapes did not lead to contamination. The lateral aspect of the proximal third of the thigh and the hip up to the anterior superior iliac spine were exposed, and the perineum was isolated from the operating field.

An adductor tenotomy was performed prior to the incision for hemiarthroplasty in 23 patients, who presented after four weeks of the injury.

A skin incision, centered at the greater trochanter and about 20 cm long [Figure 1], was made longitudinally and developed through the fascia lata along the line of the skin incision. A 2 – 3 cm long transverse incision [Figure 2] was made on each edge of the incised fascia lata, about a finger's breadth below the greater trochanter, to improve the access. A longitudinal incision was made in the conjoint

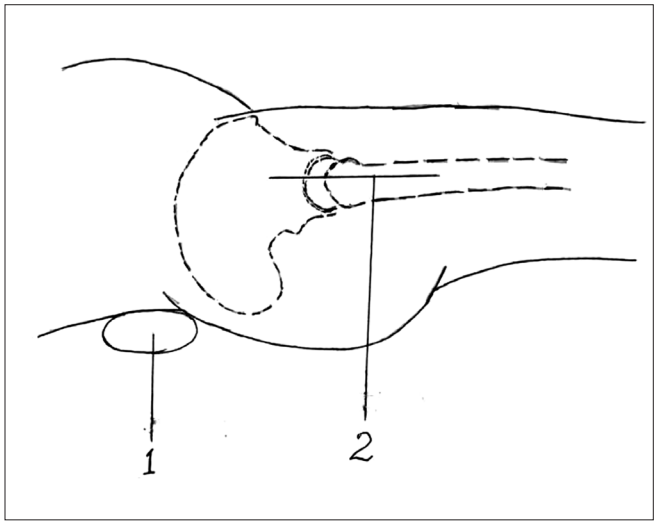

Figure 1: The sand bag (1) and skin incision (2)

tendon, midway between the anterior and posterior ends of the greater trochanter [Figure 2]. This incision was extended to the bone and a curved periosteal elevator was used to sharply dissect the conjoint tendon from the greater trochanter. The tendinous portion of the gluteus medius, the conjoint tendon, and the related vastus lateralis were carefully shaved off the anterior and posterior portions of the GT, subperiosteally. This dissection was extended downward to a proximal 5 – 10 cm of the femoral shaft. The subperiosteal space was packed with a large swab soaked in adrenaline-saline 1 in 200,000, for hemostasis. The fibers of the gluteus medius were bluntly separated upward, beyond the tip of the greater trochanter, with peanut swabs. About three to four finger breadths above the GT, a main branch of the superior gluteal artery and its accompanying veins were usually encountered. These vessels were carefully ligated and divided between clamps. Ligating them at this stage forestalled hemorrhage that could occur if they were torn during retraction. Encountering these vessels indicated closeness to the level of the superior gluteal nerve, which was liable to division or traction injury if dissection was continued further upward. The anterior and posterior portions of the gluteus medius-vastus lateralis conjoint tendon complex were retracted to expose the gluteus minimus [Figure 3]. The gluteus minimus was incised transversely near its insertion. This exposed the lateral part of the capsule, which was incised through an inverted-T incision. The glutei and capsule were then retracted upward with a Muller's retractor, to expose the greater trochanter, part of the head of the femur, and the superior rim of the acetabulum [Figure 4]. The pressure packs were removed at this point and the hip was dislocated anteriorly by flexion, abduction, and external rotation. The hip was then adducted and the ipsilateral knee crossed the other limb and positioned the limbs in a Figure 4 shape [Figure 5] and this maintained the ipsilateral limb in adduction and external rotation and brought the femoral canal in direct view, for reaming, while protecting the posterior part of the gluteus medius from being macerated by reamers. The femoral prosthesis was inserted after reaming in non-cemented procedures. In cemented procedures the femoral canal was packed with gauze soaked in adrenaline in order to control bleeding and reduce the chance of the cement mixing with blood, before curing. At the completion of the procedure, the gluteus minimus was reattached to its stump with a braided absorbable suture (size 1 vicryl). The conjoint tendon was reattached with size 2 synthetic non-absorbable monofilament sutures (Nylon) passed through two-to-three holes made in the greater trochanter with a hand drill. A vacuum drain was placed between the abductors and the fascia lata, which were repaired with interrupted size 1

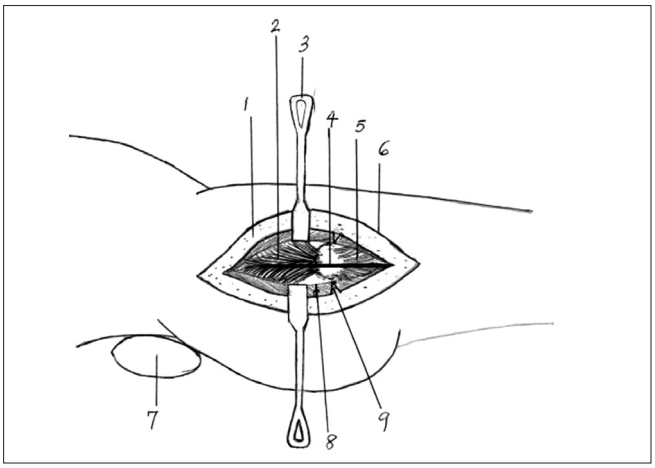

Figure 2: The incision of the conjoint tendon and adjacent vastus lateralis and gluteus medius. 1 = Subcutaneous tissue; 2 = Gluteus medius; 3 = Langebeck's retractor; 4 = The outline of the incision on the conjoint tendon; 5 = Vastus lateralis; 6 = Skin; 7 = Sand bag; 8 = Fascia lata; 9 = The transverse slit in the fascia lata

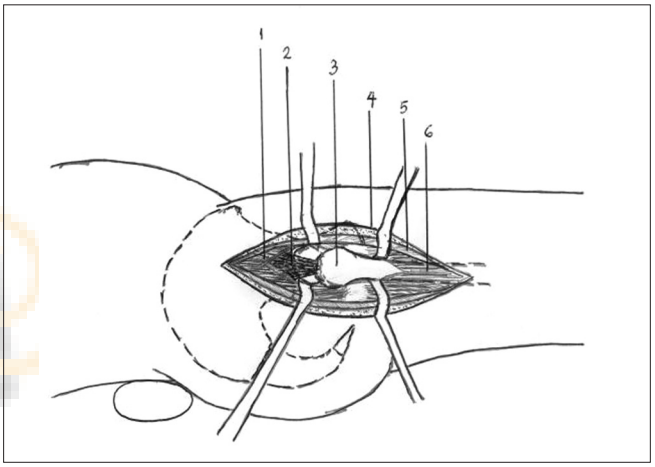

Figure 3: The dissection at the level of the Gluteus minimus and Capsule. 1 = Gluteus medius; 2 = Gluteus minimus; 3 = Greater Trochanter; 4 = Skin; 5 = Fascia lata; 6 = Vastus lateralis overlying the lateral aspect of the femoral shaft

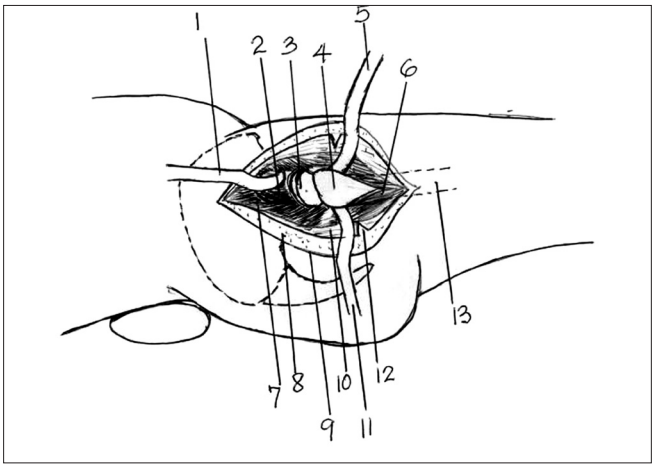

Figure 4: The status after capsular exposure and inverted – T incision. 1,5 and 11 = Retractors; 2 = reflected Gluteus minimus; 3 = Head of femur; 4 = Greater trochanter; 6 = Vastus lateralis; 7 = Gluteus medius; 8 = Subcutaneous tissue; 9 = Skin; 10 = Fascia Lata; 12 = Transverse slit in Fascia lata; 13 = Outline of the femur (Surface marking)

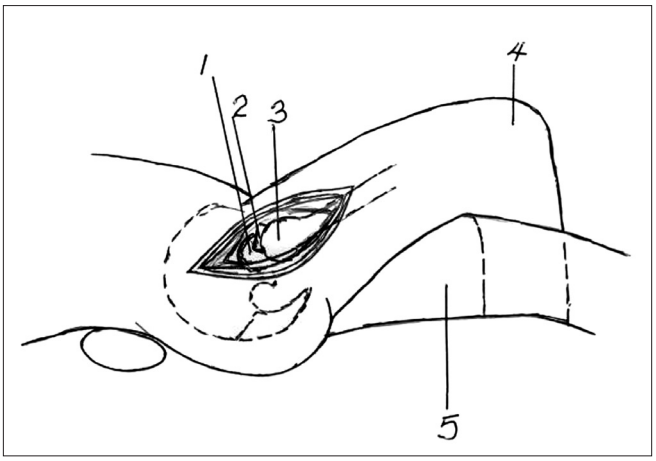

Figure 5: The hip at the point of preparation of the femoral canal. 1 = Superior rim of the acetabulum and remnant of the fractured neck and head; 2 = The distal end of the fractured neck; 3 = Greater trochanter; 4 = Ipsilateral knee lying over the contralateral thigh in roughly figure-4 shape; 5 = Contralateral thigh

vicryl. The limb was placed at 30 degrees abduction during repair of the capsule, gluteus minimus, gluteus medius, vastus lateralis, and the fascia lata. The skin was closed with an interrupted, non-absorbable, monofilament suture after closing the subcutaneous tissue with vicryl 2/0. Sterile dressings were applied.

Anticoagulants, intravenous antibiotics, and analgesics formed the immediate treatment after operation. Indomethacin capsules were given at 25 mg daily for eight weeks from the first day after surgery. The drains were removed on the second day post operation. Removal of stitches was done on the fourteenth day post operation. In addition, active abduction exercises were begun at eight weeks post operation. Postoperative partial weight bearing was converted to full weight bearing at 32 weeks.

RESULTS

Twenty-six patients were treated for over a period of 57 months. There were 17 females and nine males. The age range was 51 to 96 years (Mean = 62.3 ± 19.2). Three patients presented within the first four weeks of injury. All the other patients presented after an average of eight months had elapsed (Range = 1 month – 36 months). Out of the 26 patients, 18 had subcapital fractures, while eight had transcervical fractures. The average blood loss during surgery was 420 ml. Eighteen of the 26 stems were cemented. We recorded mortality in a hypertensive who suffered cardiovascular accident on the first day after hemiarthroplasty. A second patient with Parkinson's disease died 24 months after surgery from causes not directly related to the surgery.

There was no case of intraoperative nerve or vascular injury, intraoperative fractures, postoperative dislocation of the hip or wound infection. Two of the eight patients who had hemiarthroplasty without bone cement developed pain in the thigh, which required non-steroidal, anti-inflammatory drugs. One patient developed heterotopic ossification, which was classified as type 1. Four patients developed tenderness over the greater trochanter without any constitutional symptoms and hematological features related to wound infection, and this localized tenderness at the greater trochanter without features of infection was taken as trochanteric bursitis. Three patients who had Austin Moore prosthesis for hemiarthroplasty continued to limp after two years. Trendelenberg sign was negative in the remaining 23 patients two years after surgery. The follow-up period ranged from 28 to 84 months.

DISCUSSION

The outcome of this modification in the Stracathro approach to the hip, in this review, was good. The blood loss during surgery and incidence of intraoperative fracture, dislocation of the hip, and neurovascular complications using the approach, compare favorably with the procedures usually carried out via other variations of the lateral approach.[1-5] The rate of heterotopic ossification was one out of 26 patients and this was low when compared to studies that had reported a higher incidence of heterotopic ossification following hip arthroplasty.[8-10] The low incidence of persistent abductor weakness was seen as evidence of the capacity of careful blunt dissection, to prevent superior gluteal nerve injury. There was no case of dislocation of the hip or intraoperative fracture of the femur.

Although this series of patients was small in number and had a follow-up period ranging from 28 to 84 months (Average = 47 months), the findings were sufficient to support the conclusion that it was a promising approach for the hip, in patients who presented late with extensive osteoporosis and soft tissue contracture. The adductor tenotomy that was done at the onset of surgery and the anterior and posterior soft tissue releases that were undertaken during dissection were seen as reasons for the absence of intraoperative fracture of the femur, in spite of a degree of soft tissue contracture and osteoporosis in the patients under review. In addition, the low rate of heterotopic ossification may have been due to the use of indomethacin prophylaxis and the absence of osteotomy in the process of exposure.

The unflinching patronage of traditional bonesetters[11]

by the average orthopedic patient is the major reason behind the late presentations that have frequently created complex conditions out of ordinary lesions. These patients resort to orthodox orthopedic and trauma surgeons, when there is no more hope in sight, for a return to unaided ambulation. At this time severe osteoporosis and soft tissue contractures would have set in. Extensive soft tissue contracture in the presence of severe osteoporosis makes the risk of iatrogenic fracture exceptionally high during hip arthroplasty. The additional burden of financing internal fixation superimposed on hemiarthroplasty, as well as, the delayed return to productivity or unaided lifestyle are sufficient reasons to give consideration to this approach. Indeed, an approach that is as effective and as safe as the others, with an established low rate of posterior dislocation would make the effective cost of operation largely affordable. In a bid to have such an approach we modified the direct lateral approach by McLauchlan and Hays (Stracathro approach) to meet the needs of those patients who presented late with severe soft tissue contracture and/or osteoporosis, following fractures of the neck of the femur.

In conclusion, the short-term results in 26 patients so far are promising and beneficial, and this modification of the Stracathro approach to the hip has the potential for low rates of hip dislocation, intraoperative femoral fracture, superior gluteal nerve injury, and heterotopic calcification.

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