

# Modified Stracathro Approach To The Hip For Arthroplasty: Results In 31 Patients

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## Abstract

The choice of surgical approach to the hip is based on the preference and training of the attending surgeon as well as safety. The stracathro lateral approach has a high safety profile and a low rate of hip dislocation. However, this lateral approach is limited by the restriction to proximal dissection at about 5cm above the greater trochanter (GT) by the superior gluteal nerve, the risk of increased bleeding from osteotomized bone and increased incidence of heterotopic calcification. During hip surgery when there is soft tissue contracture around the hip, the limitations of the lateral approach become quite glaring. Extensive soft tissue contractures and severe disuse osteoporosis commonly complicate cervical fractures of the femur in sub-Saharan Africa where traditional healers dabble into its treatment. We modified the stracathro approach to suit patients presenting with soft-tissue contracture and disuse osteoporosis after ineffectual treatment by traditional bonesetters. The modification entailed sharp extensive subperiosteal reflection of the anterior and posterior halves of the musculo-tendinous unit (the conjoint tendon) of the gluteus medius and vastus lateralis off the greater trochanter without osteotomy. We have used this approach for total and hemi-arthroplasty of the hip with satisfactory outcome. The results in 31 patients are hereby presented.

## INTRODUCTION

The direct lateral approach to the hip (transgluteal approach), which is done through a lateral skin incision, splits the fibres of the gluteus medius and vastus lateralis and has several variants. The current points of variation are 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 technique of re-attachment of the sleeve of bone to its bed.<sup>1</sup>

McFarland and Osborne made one of the earliest descriptions of the gluteus medius and vastus lateralis splitting direct lateral approach to the hip, after noting that the gluteus medius and vastus lateralis are in direct functional continuity with the greater trochanter where there is localized periosteal thickening.<sup>1,2,3</sup> In the McFarland and Osborne technique, an oblique incision is made into the conjoint tendon from 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.

The entire muscle mass is released from the greater

trochanter with knife and osteotome. Retraction of the muscles anteriorly exposes the gluteus minimus which is released from its insertion into the greater trochanter to give access to the capsule of the hip joint. Hardinge modified this technique by splitting the gluteus medius longitudinally and releasing only the anterior half of the muscle along with the corresponding anterior part of the vastus lateralis.<sup>4</sup> Mclauchlan subsequently described an approach, called the stracathro approach to the hip, which entails using an osteotome to raise rectangular Osseo-tendinous flaps of the gluteus medius and vastus lateralis off the greater trochanter anteriorly and posteriorly to expose the gluteus minimus which is released from its insertion into the greater trochanter.<sup>5</sup>

Although the lateral approach generally offers satisfactory exposure of the hip joint, the extent of exposure is significantly limited superiorly by the course of the superior gluteal nerve which lies at about 5 centimetres above the tip of the greater trochanter.<sup>6</sup> Variation in the exact course of this nerve was observed by Bos et al <sup>7</sup>, who advocated that dissection above the greater trochanter should be limited to three centimetres. This suggests 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,<sup>8</sup> and a feature in patients presenting late, fracture of the greater trochanter during osteotomy of slices of bone off it in osteoporotic bones may occur and usually leads to delay in optimal restoration of hip abductors' function. Furthermore, oozing of blood from the exposed surface of the greater trochanter after osteotomy usually increases the overall blood loss at surgery. These limitations are complicated in our setting by associated contractures about the hip and disuse osteoporosis.

To obviate these limitations and reduce the risk of intraoperative fractures, we modified the Mclauchlan's stracathro approach to suit the treatment of cases with hip contracture and disuse osteoporosis. This modification provides adequate exposure and it is done in the supine position which is satisfactory for accurate orientation and placement of prosthetic components. The aim of this article is to report the early results in 31 patients so far operated via this approach.

### **PATIENTS AND METHOD**

All the patients who had hemi or total hip replacement done by the first author in the University of Benin teaching Hospital and Cenit Medical Centre both in Benin City made up the cohort. All the operations were done via the modified stracathro approach from January 2002 and July 2006. Their demographic features were noted. Their clinical features prior to the operation and in the perioperative period were also recorded. They were followed up in the clinic for a minimum of one year after surgery to detect the occurrence of complications.

The modifications that were made to the stracathro approach to the hip were: transverse relaxing incisions in both edges of the fascia lata at two centimetres below the lowest palpable part of the GT; blunt separation of the fibres 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 in the evening of the day before surgery to reduce rectal faecal load and prevent inadvertent faecal soiling that may follow loss of anal sphincter tone after epidural or spinal anaesthesia. This was necessary to reduce the risk of disastrous faecal soiling

of the operative field which may occur in our setting where impervious and adhesive sterile drapes are either non-available or irregular in supply. After anaesthesia, usually epidural or spinal, the patient was placed supine with the ipsilateral greater trochanter at the level of the edge of the operating table and a sandbag under the ipsilateral loin. Prophylactic antibiotics were given intravenously at induction of anaesthesia. 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 cetrimide, 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. 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. Impervious, adhesive and transparent sterile drapes were applied over the exposed skin to further reduce the risk of contamination of the wound and prevent infection.

A longitudinal lateral skin incision, centered at the greater trochanter and about twenty centimetres long, was made and developed to the fascia lata along the whole length of the skin incision. A two to three centimetres long transverse incision was made on each edge of the incised fascia lata at about a finger's breadth (two centimetres) below the greater trochanter to improve access. A longitudinal incision was made in the conjoint tendon at the junction between the posterior and anterior halves of the tendinous portion of the gluteus medius. This incision was extended to bone at the level of the GT and with the aid of a size 20 or 22 blade and a curve periosteal elevator, the tendinous portion of the gluteus medius, the conjoint tendon and related vastus lateralis were carefully shaved off the anterior and posterior portions of the GT subperiosteally. This dissection was extended downwards to the proximal five to ten centimetres of the femoral shaft. The subperiosteal space was packed with a large swab soaked in adrenaline-saline 1 in 200,000 for haemostasis. The fibres of the gluteus medius were bluntly separated upwards beyond the tip of the greater trochanter with peanut swabs. At 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 forestalls embarrassing haemorrhage that may occur if they are torn during retraction. Encountering these vessels usually indicates closeness to the level of the superior gluteal nerve which is

liable to division or traction injury if dissection is continued further upwards. The anterior and posterior portions of the gluteus medius-vastus lateralis conjoint tendon complex are retracted to expose the gluteus minimus. The gluteus minimus is incised transversely near its insertion. This exposes the lateral part of the capsule which is incised through an inverted-T incision. Pressure packs are removed at this point and the hip is dislocated anteriorly by flexion, external rotation and adduction. Protecting the posterior part of the gluteus medius from maceration by reamers during the preparation of the bed for the femoral stem is critical to attaining good abductor function. To achieve this, the limb should be kept over the opposite limb in a figure-four fashion; this maintains the ipsilateral limb in adduction and external rotation and brings the femoral canal in direct view for reaming. With suitable retractors at the anterior and posterior margins of the acetabulum and inferior displacement of the femur with a bifid retractor, the acetabular fossa is accessible for prosthetic fitting. For total hip replacement, the acetabulum was handled before insertion of the femoral prosthesis. At the completion of the procedure, the gluteus minimus was reattached to its stump with braided absorbable suture (size 1). The conjoint tendon was reattached with size 2 synthetic non-absorbable monofilament sutures passed through 2-3 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 braided synthetic absorbable suture. The repair of the capsule, gluteus minimus, gluteus medius, vastus lateralis and the fascia lata is done with the limb abducted at 30°. The subcutaneous tissue is closed over another vacuum drain that lies superficial to the deep fascia with 2-0 interrupted absorbable suture and the skin is closed with interrupted, non-absorbable, monofilament suture. Sterile dressings are applied. Crepe bandage is applied from toes to the groin as part of the thrombo-embolic deterrent measures and to prevent haematoma or seroma formation.

The post-operative management includes: elevation of the limb on a pillow for 96 hours; use of anticoagulants until the patient is ambulant; partial weight bearing with bilateral axillary crutches or walking frame on the tenth post-operative day. Ceftriaxone 1g daily is given intravenously for five days and metronidazole is given for twenty-four hours post-operation. Drains are removed on the second day post-op. Wound inspection and change of dressing is done on the fifth day post operation. Removal of stitches is done on the 14<sup>th</sup> day post-op. In addition, active abduction exercises are begun at 8 weeks post operation. Post operative

partial weight bearing is converted to full weight bearing at 32 weeks.

### **RESULTS**

We treated 31 patients over a period of 56 months. There were nineteen females and twelve males. The age range was 30 to 96 years (Mean = 68.3±18.4). Mean age for females was 62.2±16.3 while for males it was 78.1±22.0. The average blood loss during surgery was 540ml. Three patients presented within the first four weeks of the injury. All the other patients presented after an average of seven months had elapsed. Range = 1 month-36 months. Twenty-six patients with sub-capital or trans-cervical fractures and two patients with old unreduced posterior dislocation of the hip associated with aseptic necrosis had hemiarthroplasty. Total hip replacement was done for three patients who had osteoarthritis secondary to avascular necrosis in sickle cell disease, bony ankylosis of the hip secondary to septic arthritis and old unreduced fracture dislocation of the hip respectively. The minimum follow-up period was 12 months. Eighteen of the twenty eight hemiarthroplasties and two of the three total hip arthroplasties were cemented. We recorded mortality which occurred within a month of surgery in a known hypertensive patient who had suffered cardiovascular accident on the first day after hemiarthroplasty.

A second mortality occurred in a patient with Parkinson's disease 24 months after surgery for causes not directly related to the surgery.

There was no case of intra-operative nerve or vascular injury, intra-operative fractures, post-operative dislocation of the hip and wound infection. Three of the ten patients who had hemiarthroplasty without bone cement developed pain in the thigh which was controlled with non-steroidal anti-inflammatory drugs. Six patients developed tenderness over the greater trochanter without any constitutional symptoms and haematological features related to wound infection and this localized tenderness at the greater trochanter without features of infection was taken as trochanteric bursitis. Two patients developed heterotopic ossification. One of the two patients had total hip arthroplasty. Both cases were classified as type 1. Seven patients continued to limp after one year. All of them had uncemented Austin Moore prosthesis for hemiarthroplasty. Trendelenberg sign was negative in the remaining twenty-four patients at one year after surgery. Straight leg raising up to 90 degrees and 35 degrees of hip abduction against gravity were possible at one year after

surgery.

### DISCUSSION

The modified stracathro approach to the hip was used with good outcome in the patients under review. The blood loss during surgery, incidence of intraoperative fractures and dislocation of the hip, neurovascular complications and the range of procedures done using the approach compare favourably with the procedures usually carried out via other variations of the lateral approach.<sup>1,2,3,4,5</sup> Interestingly, the rate of heterotopic ossification was 2 out of 31 patients which is low when compared to studies that have reported higher incidence of heterotopic ossification following hip arthroplasty.<sup>9,10,11</sup> 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 and intraoperative fracture of the femur or acetabulum.

Although this series of patients was small in number and had an average follow-up period of 34 months, the findings are sufficient to support the conclusion that it is a promising approach to the hip in patients who present late with extensive osteoporosis and soft tissue contracture. The reasons for the absence of intra-operative fractures of the femur in spite of the degree of soft tissue contracture and osteoporosis in the patients under review were the anterior and posterior soft tissue releases that were undertaken during dissection and the adductor tenotomy that was done at the onset of surgery. 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 peculiarity of presentation of patients with orthopaedic and orthopaedic trauma problems in Nigeria is related to unflinching patronage of traditional bonesetters<sup>12</sup> by the average orthopaedic patient. These patients only resort to orthodox orthopaedic and trauma surgeons when it is evident that there is no hope in sight for return to unaided ambulation. At this time the patient would have developed complications which include severe osteoporosis and soft tissue contracture. Extensive soft tissue contracture in the presence of severe osteoporosis makes the risk of iatrogenic fractures exceptionally high during hip arthroplasty. Indeed, the possibility that the prevailing level of poverty amongst a substantial number of patients in a health care system, where individuals fund themselves, would make the added cost of intraoperative fracture during hip arthroplasty unaffordable

informed the decision to modify the direct lateral approach by McLauchlan and Hays (Stracathro approach). This modified stracathro approach was designed to meet the special needs of those patients who presented late with severe soft tissue contracture and/or osteoporosis following fractures of the neck of the femur, unreduced fracture dislocation of the hip, avascular necrosis complicated by severe osteoarthritis or ankylosis of the hip. Our experience so far with 31 patients shows significant benefits and rather promising short-term results.

In conclusion, this technique has the potentials for low rates of hip dislocation, intraoperative femoral fractures, superior gluteal nerve injury and heterotopic calcification. The liberal anteroposterior soft tissue release without osteotomy of the greater trochanter holds the key to the actualization of these potentials.

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