

# Greater Trochanter Reconstruction in Unstable Intertrochanteric Fractures Treated With Cemented Bipolar Hemiarthroplasty: A Technical Note

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## Abstract

Cemented Bipolar arthroplasty is an established method for treatment of comminuted Intertrochanteric fractures. Reconstruction of greater trochanter is an essential technical step to avoid complications like abductor lurch gait. We here describe a technique of reconstruction and fixation of greater trochanter using cancellous screws with wide washers made of reconstruction plate and tension band wiring. This gives a stable fixation of greater trochanter and avoids cut out, slippage of implants.

**Keywords:** Intertrochanteric fractures, greater trochanter fixation, cancellous screws, tension band wiring.

## Introduction

Arthroplasty for intertrochanteric fractures has been described as early as 1973. Rosenfeld et al [1] devised a prosthesis for head and neck replacement in trochanteric fracture, detailed the method of surgery and reported a good functional outcome. Later in 1987 Stern and Angerman [2] described similar procedure with Leinbach prosthesis for management of comminuted intertrochanteric fractures. Management of intertrochanteric fractures has gone through many advances and changes since then but not many studies are published regarding the method of greater trochanter (GT) reconstruction. To address the issue the surgeon has to be aware that many intertrochanteric fractures occur in elderly frail patients with osteoporotic bones and poor bone stock and the difficulty in reconstruction after internal fixation or hemiarthroplasty. Described here is a method that restores the tension in abductors muscles and allows the patient mobilize with support at the earliest thus avoiding complications with bedridden patients.

## Technical Note

We have noticed four types of fracture greater trochanter associated with inter-trochanteric fractures; Single fragment GT, Comminuted GT but with one or two major fragments, completely comminuted GT, coronally split GT. The technique described here can be used if the GT is single fragment or has one or two major fragment. In coronally split GT or in GT having two major fragments, a primary fixation of GT is done using cancellous screws and SS wires after which this technique can be applied. For comminuted GT this technique cannot be used and primary soft tissue repair is required to restore the GT. Multiple K wires and tension band wiring may help in these cases

Technique: All cases were operated through Hardinge approach. Cemented hemiarthroplasty was done primarily in the index case as per standard described technique. After reduction the GT can be retracted posterolaterally and cemented bipolar prosthesis can be seen with the distal femur (Fig. 1a). The GT is then reposed back over the proximal end of femur. The repositioned GT fragment or the major GT fragment is then held by using patellar clamps and stabilized by passing K wires from the GT fragments into the antero-medial cortex of the distal femur (Fig. 1b). The entry of the K wires is from the postero-superior surface of the GT and travels antero-inferior to engage the opposite

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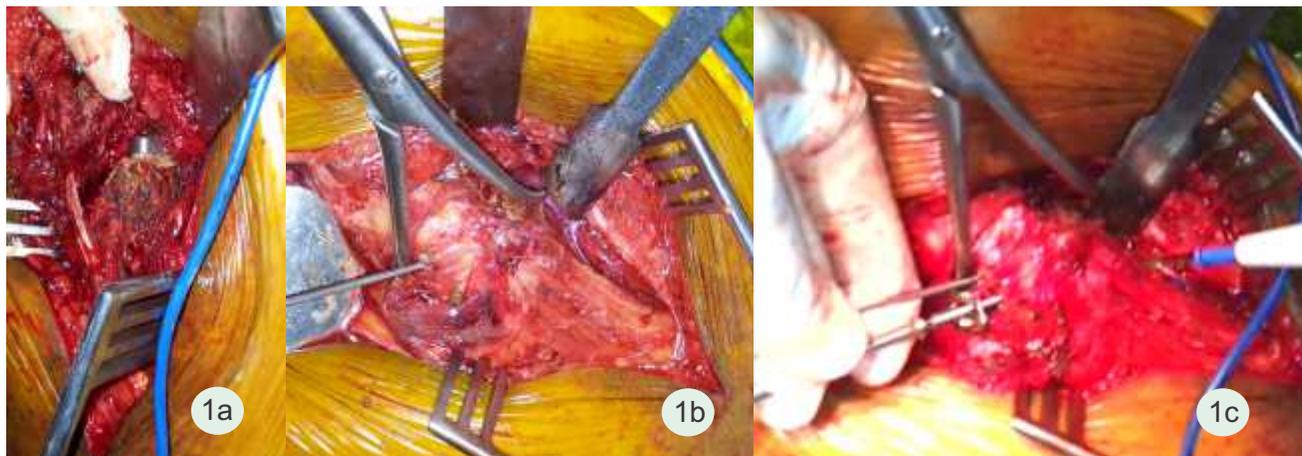


Fig 1a Fracture pattern of greater trochanter demonstrated after fixation of prosthesis by uncapping the GT from the posterolateral aspect of proximal femur. Fig 1b. Temporary fixation of GT is achieved by passing K wires from GT to the lateral cortex. 1c. 4mm cannulated cancellous screws are then inserted over the K wires with square recon plate washers.



Fig 2a A hole was drilled parallel to lateral cortex to pass SS wire in the subtrochanteric region. Fig 2b. Wire loop is passed below the Square washers. 2c. Final tightening of the loop and stable fixation of the greater trochanter. 2d Post operative radiograph showing fixation of the greater trochanter.

cortex. The wire is passed closely parallel to the lateral cortex in frontal plane. Definitive fixation is achieved using partially threaded 4 mm cancellous screws. The screws are also passed in the same direction as the K wire and may go through the cement mantle (further improves pull out strength) to reach the opposite cortex. We are using single hole reconstruction plate pieces as washers for the cancellous screws (Fig. 1c). These are made by cutting a reconstruction plate using medium plate cutter. The rationale of using these square reconstruction plates' pieces is increased surface area which allows good compression to be achieved by the screws. The normal washers when used are smaller in size and most of the times sink into the soft bone rather than holding the counter-compression. With cut reconstruction plates we have not encountered this counter-sinking problem of normal washer. Two to

three such screws with washers are put depending upon the size of the GT fragment. This screw fixation stabilizes the GT to the main femoral shaft. This fragment is then further stabilized by tension band wiring to the distal femur. Figure 2a shows transverse drilling into the distal femur (area around 2-3cms distal to the overlapping of GT) for passage of the tension band wire the proximal end of the tension band is then looped beneath the gluteus medius tendon and the wires are crossed on the posterolateral surface of GT. These wires are preferably crossed below one or two of the square washers to avoid wire slippage (Fig. 2b,c). With both screws and tension band wiring in place the GT is firmly stabilized to the proximal femur. Trochanteric bursa is sutured over greater trochanter to prevent bursitis. Patient are made to weight bear from 2nd post operative day. Radiograph shows good

fixation of the greater trochanter (Fig. 2d)

### Discussion

Treatment of unstable intertrochanteric fractures in patients above the age of 65 is fraught with difficulties[3]. It is impossible to avoid full weight bearing in these patients immediately after surgery. Hemiarthroplasty is a reliable procedure for the management of trochanteric fractures in elderly frail patients as it allows immediate weight bearing and lower chances of complications due to immobilisation [4]. Many studies in literature have supported cemented bipolar hemiarthroplasty as a viable option and lot more have compared the advantages and disadvantages of hemiarthroplasty over internal fixation [5-7]. Success of a hemiarthroplasty depends on multiple factors like posteromedial cortical comminution, cementing technique, abductor tension, restoration of limb length and greater trochanteric reconstruction. Greater trochanteric reconstruction in osteoporotic and comminuted trochanteric fractures is a technically demanding job. Multiple methods of trochanteric reconstruction have been described [8,9]. Circlage wiring, cancellous screw fixation, K wire fixation, cable system, ethibond sutures are among the procedures most commonly used [10,11,12]. This mainly helps in reducing the incidence of abductor weakness and abductor lurch postoperatively. The method described here gives a stable reconstruction and allows the patient full weight bearing immediately after surgery. All the patients had good abductor muscle power when examined 6 weeks post operatively.

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