



THIRD TROCHANTER OF HUMAN FEMUR – AN INTRAMEDULLARY APPROACH

Anatomy

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ABSTRACT

Femur is a principal weight bearing bone and its structure can be change due to physical activity in routine. One of its change is third trochanter. It's an oval, rounded or conical bony elevation at upper part of gluteal tuberosity. Trochanteric area is an important region in orthopaedic surgery, as it's a point of entry, commonly lateral side of greater trochanter, even anterior & posterior routs also available. **Summary:** The aim of present study was, to analyse third trochanter of human femur & its clinical implication. The study has been conducted on 200 adult dry human cleaned femora of unknown age & sex. Out of 200 femora TT was noticed in 16 (7 Rt & 9 Lt), dominantly in left side. The introduction into clinical practise of intramedullary nails with a proximal lateral bends has facilitated trans trochanteric insertion. The trochanteric starting point potentially offers reduced rates of complications and technical ease, especially in obese patients.

KEYWORDS

Third trochanter (TT), Greater Trochanter and intramedullary nails.

INTRODUCTION:

Bones are highly vascular mineralized connective tissue, contains cells & matrix. Femur is a principal weight bearing bone and its structure can be change due to physical activity in routine. One of its change is third trochanter.¹ It's an oval, rounded or conical bony elevation at upper part of gluteal tuberosity.

An intramedullary nail (Fig.2.) is a metal rod that is inserted into the medullary cavity of a bone and across the fracture in order to provide a solid support for the fractured bone.

Intramedullary nailing is currently considered the "gold standard" for the treatment of femoral shaft fractures.⁹ Proposed advantage of intramedullary nailing include short hospital – stay, rapid union of the fracture and early functional use of limb.¹²

The introduction into clinical practise of intramedullary nails with a proximal lateral bends has facilitated trans trochanteric insertion. The trochanteric starting point potentially offers reduced rates of complications and technical ease, especially in obese patients.

The greater trochanter and piriform fossa are common entry points for femoral ante grade nailing. Third trochanter gives increased skeletal mass as a reinforcement mechanism for proximal diaphysis in response to increase ground reaction force. An additional role of third trochanter is to alter direction of tendon of gluteus maximus muscle.²

In this regards the osseous, cartilaginous & tendinous complex of third trochanter may be a preventive factor and determinant of fracture location & shape. The strong enthesal development in femoral attachment of gluteus maximus suggest a strong mechanical effort of joint in extension, lateral stabilization and control of thigh indicating medico-lateral reinforcement to resist high mechanical stress in erect posture and locomotion.⁵

However, in some species of laboratory mammals third trochanter plays an important role as a useful landmark for biomechanical studies & densitometry and as the access point of choice for medullary cavity.⁷ The factors responsible for aetiology and expression of third trochanter as well as other postcranial nonmetric skeletal traits are not well delineated.⁴

In an animal model study using Aramidillo femur when coronal plane forces were applied it was observed that muscles which are attached to third trochanter can counter the bending strains in loaded femur. So theoretically it's a possibility that femora with third trochanter are more resistant to fractures. With the advent of proximal locking compression platen (PF-LCP), which is a recon toured fixation device which can improve osteosynthesis of fractures of the trochanteric region of femur, any anthropometric data of same can used for anatomical shape design of these femoral plates.

MATERIAL & METHODS:

The study has been conducted on 200 adult dry human cleaned femora of unknown age & sex.

All the bones were examined carefully for any variations by visual inspection, appropriate measurements were taken & specimen were photographed.

Bones which have gross pathological deformities, broken & non dried specimens were excluded from study.

For this study the third trochanter (Fig.1) is defined as the osseous oval tubercle in the superior part of gluteal tuberosity. It is localized in the majority of cases laterally to the line connecting the top of the greater trochanter with the superior bifurcation of the linea aspera.

The length and width of third trochanter wherever found have been taken by using a digital Vernier caliper. Photographs have been taken by a Casio digital camera (12 mega pixels).

Each photograph should have a definition of 16x12cm. Total length of femur was measured with INOX digital Vernier caliper in point to 2/3 additive stages.



(Fig. 1. Third trochanter, Right Femur)



(Fig. 2. Femoral Intramedullary Nails)

RESULTS:

The study was carried out on a collection of 200 dried adult femora of unknown age & sex available at departments of anatomy from different medical colleges of Rajasthan.

Out of total 200 femora studied, the presence of third trochanter was noticed in 16 (8.0%) femora. Out of which 7 (3.5%) was in right side(R) and 9 (4.5%) in left side.

Third trochanter was predominantly observed higher in left side.

DISCUSSION:

Intramedullary nailing aims to preserve anatomical structure of fracture sites and to provide a proper environment for fracture healing. This in turn should improve function and reduce long-term complications such as pain from arthritis.

Furthermore, nailing helps to limit the damage to the soft tissues in the vicinity of bone during surgery and thereby helps preserve the blood supply to allow fracture healing and obtain a good functional recovery.

The classic approach of inserting straight nail through the greater trochanter has been reported to be prone to severe heterotopic ossification, fracture communication and varus deformity.

Postulated advantages for reamed nailing include improved fit within the medullary cavity and thus a stronger fixation for the fractured bone, and accelerated healing resulting from the bone debris created during reaming.

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