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Proximal Femoral Nailing: Getting the Trajectory Right

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Abstract

Getting the trajectory of the proximal femoral nail in the right direction is essential to achieve a good result in the technically demanding surgery of proximal femoral fracture. Either an inappropriate starting point or a failure to match the chosen implant's lateral entry angle may cause coronal plane deformity after trochanteric entry nailing. The lateral view is the critical view for localization of the proper starting point. For the right execution of the surgery, getting the trajectoy right is fully under the control of the surgeon and should always be attempted.

Keywords

PFN, Proximal Femoral Fracture, Unstable Pertrochanteric Fracture, Nail Trajectory

1. Background

The use of proximal femoral nailing in pertrochanteric fractures is increasingly becoming popular due to the superior biomechanics and prevention of varus collapse. Though it is extremely unlikely to reduce the complications in totality, a better understanding in the procedure certainly helps in the achieving better results. External rotation, abduction, and flexion of the proximal fragment in proximal femoral fracture are the obstacles in nailing.

We aim to present a technical tip to get the trajectory of the nail right and minimize the surgical time.

2. Procedure

The operation of a 55 years old male labourer who had sustained an unstable intertrochanteric fracture on the left side was performed on fracture table in supine position under spinal anesthesia. He had no morbidities and was taken up for surgery within 7 hrs from the fall.

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Informed consent of the patient was carried out before the procedure. The closed reduction of fracture is confirmed by image intensifier. Site of the proposed skin incision is marked when checking for the reduction under Image intensifier. An estimate of the overall femoral version is assessed. The skin is marked approximately 5 cm scephalad to the tip of the trochanter.

The reduction is checked in lateral view. The neck shaft angle is ascertained. The shaft axis is marked and the proposed entry point from the greater trochanter is marked either with a sterile surgical skin marker or the skin is stroked with a small K wire to overlap the shaft axis and cast a small impression (**Figure 1**).

The incisions are taken corresponding to the skin markings done at the time of the reduction. The procedure is carried out in the usual manner (**Figure 2**) and one can expect a good post operative alignment with nail *in situ* (**Figure 3**). The procedure was performed within 35 minutes.

It is essential that the femoral version preoperatively can be helpful in the setting of comminution with no cortical keys available to judge realignment.

Figure 1. Showing the skin marking ascertained at the time of C arm imaging.

Figure 2. Showing the skin incision at the end of the procedure.

Figure 3. Showing the post operative view.

3. Discussion

To achieve a preliminary reduction is one of the foremost pre requisite of any surgery of the proximal femur [1].

The nail entry site should be approached only once the reduction is achieved and ascertained under the image intensifier. Technical difficulties and implant related complications are described in many series [2].

Anatomically the femoral head and neck are anteverted approximately 10˚ - 15˚ in relation to the plane of the femoral shaft. The piriform is fossa which lies at the base of the neck is oriented in line with the femoral shaft. The lesser trochanter is posteromedial, and it is the point of insertion for the psoas and iliacus tendons. The femoral shaft has both an anterior and a lateral bow [3]. The anterior curvature of the femur affects insertion of the intramedullary nail. This may cause cortical penetration or fracture angulation if the mismatch between the nail and femoral curvatures is significant [1].

The main technical issues are related to guide wire placement especially when greater trochanter and piriform fossa are shattered. There can be difficulties in securing a good entry point, loss of reduction while passing nail, and finally difficulties faced during placement of hip screws.

It has been demonstrated that anterior misplacement of the nail entry site, increased nail flexural rigidity, and mismatch in radius of curvature all affect the potential for femoral bursting during nail insertion [4] [5].

Various techniques such as the use of along hemostatic forceps or bone clamps [6], clamps [7] or mini open incision at the fracture site helps in the reduction, which is especially relevant for the subtrochanteric and reverse trochanteric fracture.

The guide pin should be placed parallel to the shaft of the femur and should bisect the radiographic projection of the femoral neck and head on the lateral fluoroscopic image.

The small technical tips helps to align the implants in line with the shaft. It also gives a fair idea regarding the anteversion of the neck.

It is a useful tip and helps in minimising the length of the incision and reducing the blood loss. The inadvertent insult to the soft tissue of the proximal femur, when the trajectory is lost, can be minimized.

By making the preliminary skin markings on the skin, parallel to the axis of the femoral shaft, the duration of the surgical time is minimized. At the same time the radiation time is curtailed and the eventual morbidity associated with the surgical procedure is restricted. The morbidity, mortality, and the related risk factors after hip fracture

surgery have been studied but unfortunately the research is still underway as to how it affects the functional outcome [8].

4. Conclusion

In the final analysis, we believe that, achieving a good reduction between two main fragments without varusmalalignment and placement of hip screw in a correct position are two important technical aspects which, when supplemented with the proper trajectory of the nail prevent most of the surgeon dependent complication.

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