

Hip Abductor Muscle Weakness after Antegrade Nailing of Femoral Fractures

Ahmed M Ahmed and Ahmed A Khalifa*

Orthopaedic Department, Qena Faculty of Medicine and Its University Hospital, South Valley University, Qena, Egypt

*Corresponding author

Ahmed A Khalifa, Assistant professor and consultant of orthopaedic and traumatology, Orthopaedic and Traumatology Department, Qena faculty of medicine and its university hospital, Qena, Egypt

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Abstract

Nailing of femoral fractures is now considered as the standard line of management, although having many advantages, this technique carries some risks related to the technique, in this short review we will handle the issue of hip abductor muscle weakness after antegrade nailing of femoral fractures.

Introduction

Intra Medullary Nailing (IMN) now considered as the standard line of management for femur fractures with a reported excellent result, however, this technique carries some complications such as non-union, locking screws breakage and abductor muscle weakness especially with piriformis fossa entry point nails [1, 2].

Current reports suggest that this abductor functional impairment persists even years after fixation of femoral fractures [3-6]. Up to 50% of these patients lose the ability to function independently and are unable to return to their preinjury ambulatory levels [7-14].

Bain et al. reported that after a minimum of twenty-four months post-surgery, 41% of thirty-two patients in whom femoral shaft fracture had been treated with an IMN limped at the follow up, this hip abductor weakness and resultant limp have been reported to persist for up to 4 years after injury, and clinical complaints have correlated with hip abductor weakness [4].

The results of a study by Rasch et al. showed that 6 months postoperatively, hip muscle deficit was 18% [15]. Another study in elderly people by Binder et al. showed that between 22% and 75% of hip fracture patients do not return to their pre-injury ambulatory or functional levels between 6 and 12 months after the fracture [16].

Helmy et al. demonstrated a statistically significant lower peak torque generation by the hip abductors in the injured limbs when compared with the normal control limbs. Testing of other muscle groups in the thigh (knee extensors) failed to demonstrate weakness. It would appear, therefore, that the most likely explanation for hip abductor weakness is the surgical approach. Individuals with the nail still in place showed higher peak torque forces of the abductors possibly indicating a tendency that a nail removal might further deteriorate the hip abductor apparatus [17].

Although they concluded that there were no statistically significant differences in gait pattern between the injured and normal limbs

based on temporal-spatial, kinetic, and kinematic parameters [18]. Revealed that patients treated with antegrade intramedullary nailing demonstrated a significant negative effect on gait parameters, hip kinematics and kinetics, and this effect was time-dependent.

Ivanova et al. concluded that after proximal femoral fractures (PFF) treated by proximal femoral nails (PFN), the hip muscle isometric strength for the injured limb was significantly decreased 1 week and 6 months postoperatively. A week following the surgery, the abductor muscle strength for the fractured limb was decreased by 55.6%, compared to the nonfractured leg. Significant improvement was noted in the strength generating capacity in the fractured leg during 6 months' follow-up, but the deficit compared to the nonfractured leg persisted. At 6 months' follow-up, the hip abductor isometric muscle strength deficit for the fractured leg was 29.9%. These data demonstrated a slow recovery of muscles strength and full activity [19].

Ansari et al. conducted two studies comparing abductor weakness in two groups: Unreamed Femoral Nail (UFN) inserted at the piriformis fossa and Antegrade Femoral Nail (AFN) inserted from the tip of the greater trochanter. In one study, MRI showed in nine patients, four from the UFN group and five from the AFN group, iatrogenic lesions in the abductors. In two of these patients, one from each group, atrophy was seen in the gluteus muscles. After a mean follow-up of 48 months, the Trendelenburg test was slightly positive in five patients in the UFN group, as well as in five patients from the AFN group. The peak torque and endurance in the injured leg were found to be moderately reduced for abduction in both groups. The endurance ratio for all of the exercises was consistently decreased in the injured leg compared with the contralateral side in both groups. After a mean follow-up of 4 years, the majority of the patients in both groups had some degree of weakness, limping, and residual pain in the gluteal region. Comparison of the isokinetic muscle function tests revealed some strength reduction in the abductor apparatus in both groups with no appreciable differences between the groups [20].

In the second study, the Trendelenburg sign was positive in five patients from the UFN group (56%) and negative in all patients with a long PFN. Comparison of static MRIs revealed no statistically significant differences. However, the maximum thickness of the abductor muscles was more reduced in the injured hip region in the UFN group than in the long PFN group. There was also more fat accumulation and fibrosis in the abductor apparatus in the UFN group on the injured side than in the long PFN group. The values for peak torque and endurance in the injured leg were moderately reduced during abduction in both groups. These endurance values were significantly lower in the UFN group [21].

A more recent study by Nitin et al. found that, postoperatively, two patients (4.4%) had initial abductor power grade I, 29 patients (64.4%) had grade II and rest had grade III. All patients regained grade V power at six months except two patients (grade IV power) who had varus malunion [22].

Conclusion

Abductor muscle weakness following antegrade nailing of femoral fractures is a real concern which can lead to patient disability, meticulous surgical technique, as well as early rehabilitation protocol, should be taken into consideration when dealing with such patients.

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