

Non-Displaced Femoral Neck Fractures in Elderly Patients

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Received date: February 07, 2021, Manuscript No. IPARS-22-13022; **Editor assigned date:** February 09, 2021, PreQC No. IPARS-22-13022 (PQ); **Reviewed date:** February 23, 2021, QC No. IPARS-22-13022; **Revised date:** February 28, 2021, Manuscript No. IPARS-22-13022 (R); **Published date:** March 07, 2022, DOI: 10.36648/2472-1905.8.2.7

Citation: Austrian H (2022) Non-Displaced Femoral Neck Fractures in Elderly Patients. J Aesthet Reconstr Surg Vol.8 No.2:007.

Description

In the past two decades, the group of micro-posterior approaches was introduced. In 2008 Brad Penenberg developed the Percutaneously-Assisted Total Hip (PATH) approach, a tissue-sparing approach leading through the interval between m. gluteus medius and the conjoined tendon of the external rotators. In 2004 Stephen Murphy developed the super capsular (super cap) approach, preparing the hip in situ to reduce soft tissue traumatization caused by the dislocation maneuver used in the conventional posterior approach. In 2011, James Chow described the super capsular percutaneously-assisted total hip (super path) approach, which was developed on basis of the surgical techniques of those earlier micro-posterior approaches.

Outcome Measurement

In this way, super path managed to combine the impressive advantages and outcomes of both micro-posterior approaches. Important features of Super path are the following: operating the hip in situ with the lower extremity rested on a Mayo stand during the entire operation; tissue-sparing technique through the interval between m. gluteus medius and m. piriformis; preservation of the capsule; percutaneous accessory portal for acetabular preparation for un-obscured visualization. This is an overview of the conventional approaches (anterior, anterolateral, lateral transgluteal, lateral trans-trochanteric, posterior, and posterolateral) to the hip joint and a more detailed description of super path. Meta-SuCAs-2 measured the following outcome parameters according to their importance. Primary outcomes were the intraoperative blood loss in ml, Harris Hip Score (HHS) in points, and postoperative complications such as hip dislocation, per prosthetic fracture, infection, deep vein thrombosis, and hematoma. Secondary outcomes were the pain visual analogue scale (VAS) in points, operation time in min, and incision length in cm, acetabular cup inclination, and ante version angles in degrees.

Femoral Neck Fracture (FNF) is one of the most common bone and joint injuries in the clinic. The most common and serious complication is femoral head necrosis. The main cause of traumatic femoral head necrosis is the destruction of the femoral head blood supply. The femoral head is supplied by three groups of blood vessels: the superior, inferior, and anterior retinacular arteries. When femoral neck fractures occur, some of the blood vessels are usually damaged, which leads to avascular

necrosis of the femoral head. The greater the displacement degree of fracture, the more severe the degree of vascular injury.

Anesthesia and Position

This was a retrospective study that was approved by the institutional ethics committee of our hospital. From January 2016 to June 2018, 287 consecutive patients who received TLIF treatment were retrospectively analyzed. The clinical characteristics and the preoperative and postoperative radiographs of the patients were reviewed. All patients in this study experienced leg pain or paralysis caused by lumbar degenerative diseases before operation, but conservative treatment could not alleviate these symptoms. Of 287 patients, 130 patients met the inclusion criteria.

Demographic variables were as follows: age (years), gender, and Charlson's Age-Comorbidity Index (CACI). CACI is the most commonly used method to evaluate the severity of comorbidities in elderly patients. It is calculated based on the patient's medical history, prognosis and weighted age. Fracture-related variables included affected side, Garden classification, Pauwels classification and comminution of posterior wall.

In recent years, great progress has been made in the field of artificial joint replacement technology; however, for younger patients with higher hip activity requirements, the current strategy tends toward native hip joint preservation. CT can be used to observe the degree of fracture displacement from a three-dimensional perspective. Because the retinacula are all attached to the femoral neck surface, accurate judgment of the degree of fracture displacement can lead to an indirect inference of the damage to the retinacular blood vessels. In addition, previous studies have shown that the main source of blood supply to the femoral head includes the retinacular arterial system, round ligament arterial system, and intramedullary arterial system.

Numerous surgical procedures have been recommended to treat femoral neck fractures, including arthroplasty, cannulated screw system, dynamic hip screw, dynamic condylar screw, and proximal femoral nail antirotation. Currently, it is generally accepted that arthroplasty should be used for displaced femoral neck fractures in elderly patients. However, the optimal management of nondisplaced elderly femoral neck fractures remains controversial. Though arthroplasty had several

advantages, such as improved mobility and fewer major reoperations, it was reported that there was no significant difference between internal fixation and arthroplasty in long-term mortality and reestablishing hip functions. Besides, the result of a successful hip replacement is not exactly equivalent to a united femoral neck fracture, especially in Chinese elderly patients who like squatting or sitting cross-legged. Therefore, the hip preservation should be performed as much as possible in elderly patients with nondisplaced femoral neck fractures.

Under fluoroscopy, a guide pin was inserted with attaching to the femoral calcar as close as possible and paralleling to the femoral neck axis in the anteroposterior view. In the lateral view, the guide pin should be located at the center of the femoral neck and paralleled to the anteversion angle. Then, a second guide pin was placed close to the upper margin of the femoral neck. Subsequently, according to the position of the two guide pins, the third and fourth guide pins were inserted close to the anterior and posterior cortex of the femoral neck. The four guide pins formed a rhombic shape. Of note, all the head of guide pins

were 5 mm under the femoral head surface. Finally, four partial cancellous threaded cannulated compression screws were inserted along the guide pins. After ensuring the quality of reduction in the anteroposterior and lateral views, the incision was closed.

After meticulous discectomy and endplate preparation, the cage filled with the autologous bone graft was inserted into the disc space. All TLIFs were performed with bullet-shaped cages with no lordosis. After the cage was placed, the bilateral pedicle screws and rods were axially compressed and fixed to restore the lordosis while maintaining the recovered disc height. All cages were polyetheretherketone devices with radiopaque markers to identify its position. PDH was defined as the vertical distance between the posterior end of the inferior and superior endplates, while ADH was the distance between the anterior ends. The loss of PDH and ADH indicated the degeneration of the lumbar spine and would affect the lumbar lordosis. In addition, the change of PDH could indirectly indicate the change of FH.