

Transtrochanteric fractures

AUTHORS

Brazilian Society of Orthopedics and Traumatology, Brazilian College of Radiology

PARTICIPANTS

Roberto ST Canto, Marcos Sakaki Itiro Suzuki, Pedro Tucci, Willian Belangero, Maurício Kfuri Jr., Abdalla Y Skaf

DESCRIPTION OF THE EVIDENCE COLLECTION METHOD:

Study performed at MEDLINE database, using MeSH (Medical Subject Heading) interface. The keywords used were: (old people AND trochanteric fracture AND conservative treatment AND outcomes) OR (old people AND trochanteric fracture AND (surgical treatment OR dynamic hip screw OR intramedullary nail OR Jewett plate OR Gotfried plate OR Ender Nail OR external fixator OR hip replacement) AND outcomes).

DEGREES OF RECOMMENDATION AND STRENGTH OF EVIDENCE:

- A:** Experimental or observational studies of best consistency.
- B:** Experimental or observational studies of least consistency.
- C:** Case reports (non-controlled studies).
- D:** Opinion without critical evaluation, based on consensus, physiological studies or animal models.

INTRODUCTION

Transtrochanteric fractures are extracapsular and occur between the great and the small trochanters. They comprise one-fourth of hip fractures and are more common among elderly individuals. Their increasing incidence is a matter of concern, together with socioeconomic costs. The correct diagnosis is attained by performing an x-ray in the anteroposterior view, after gentle traction with internal rotation. The treatment aims at early fracture stabilization, with minimum additional morbidity, to allow immediate function recovery. The comorbidities must be diagnosed and treated in the preoperative period. The fractures can be stable or unstable, due to the degree of postero-medial cortical comminution that exceeds the isolated fracture of the small trochanter, or the reverse oblique pattern, which biomechanically behaves as a subtrochanteric fracture. The frequency of unstable fractures increases with age and osteoporosis. Stable fractures have a much lower complication rate, when compared with unstable ones.

The choice of the implant, good reduction and exact placement of the implant using a meticulous surgical technique can decrease postoperative complications of unstable fractures. The successful surgical outcome does not necessarily mean an equivalent functional outcome, as a significant number of patients do not recover the ambulation status prior to the fracture.

WHAT IS THE USEFULNESS OF SKIN OR SKELETAL TRACTION IN THE PREOPERATIVE PERIOD OF TRANSTROCHANTERIC FRACTURES?

The use of skin or skeletal traction to relieve pain in the preoperative period has no support, as there is no difference regarding analgesic consumption and pain assessment using the analogical scale when using or not using traction¹(A). The common or special pillows placed under the fractured hip provide the same analgesic effect than skin or skeletal traction¹(A). When the normal nursing care without traction was compared with the same care with skin traction, there was no difference regarding analgesic consumption, surgical procedure facilitation or decubitus ulcer incidence²(A). The use of skin or skeletal traction in the preoperative period of transtrochanteric fractures is contra-indicated and its use is limited to special situations³(A).

DOES THE EARLY SURGICAL TREATMENT (24 HOURS) OF PATIENTS WITH TRANSTROCHANTERIC FRACTURES OF THE FEMUR DECREASE MORTALITY RATES?

The surgery performed within the first 24 hours does not decrease the mortality rates during the first year of life in patients with transtrochanteric fractures⁴(A). The patient must be clinically compensated to be submitted to the anesthetic and surgical procedures⁵(B). The factors related to mortality increase are: age > 80 years, presence of three or more comorbidities (mainly cardiac ones), mental impairment, institutionalized patient and male sex⁶(A).

WHAT IS THE BEST ANESTHETIC PROCEDURE FOR THE PATIENT WITH TRANSTROCHANTERIC FRACTURE OF THE FEMUR?

Regarding the type of anesthesia, there is no difference concerning the postoperative mortality. With spinal blocks, there is a lower tendency of myocardial infarction, mental confusion, hypoxia and bronchopneumonia⁷(A). During the preoperative period, the continuous epidural infusion of local anesthetics and opioids must be administered to decrease adverse cardiac events⁸(A). During the intraoperative period, there is evidence of a higher num-

ber of episodes of hypotension and ST-segment decrease with general anesthesia and single-dose spinal block⁹(A). There is no difference between the anesthetic block and general anesthesia regarding the functional recovery and time to weight bearing⁷(A).

ARE THERE ANY ADVANTAGES REGARDING THE USE OF MEDOFF PLATE IN RELATION TO DHS AND CEPHALOMEDULLARY NAILS?

The Medoff sliding plate allows sliding not only on the transtrochanteric region as the DHS, but also on the subtrochanteric region, called biaxial dynamization. The outcomes of its use, when compared to the DHS without and with trochanteric supporting plate and the DCS, are equivalent regarding fixation failure and ambulation capacity after one year of follow-up¹⁰(A). The biaxial dynamization provides a higher degree of femoral shortening in the treatment of unstable transtrochanteric fractures, when compared with DHS (15 mm vs. 11 mm); however, such fact seems to protect the osteosynthesis during the consolidation process¹¹(A). Regarding subtrochanteric fractures, the use of the Medoff plate in biaxial dynamization mode leads to a high rate of mechanical failure, higher than the one obtained with the Gamma nail¹²(A).

Does the side of the transtrochanteric fracture influence the outcomes when DHS is used?

When the cephalic screw is positioned in the DHS, the clockwise rotational torque tends to deviate the transtrochanteric fractures in left femurs and reduce those in right femurs. The loss of reduction can be observed through the identification of an anterior bony protuberance at the x-ray, which corresponds to distal and medial portion of the deviated neck, with consequent decrease in stability. Measures to prevent neck rotation must be taken during the fixation of left femoral fractures¹³(B).

WHAT ARE THE ADVANTAGES AND DISADVANTAGES OF USING A DHS PLATE WITH A MINIMALLY INVASIVE TECHNIQUE?

The osteosynthesis with DHS plate and minimally invasive technique in the treatment of transtrochanteric fractures leads to lower blood loss, lower surgical time and lower degree of pain in the postoperative period, when compared with the DHS plate used in the conventional way, without sacrificing fracture stability and consolidation¹⁴(A).

CURRENTLY, IS THERE STILL A PLACE FOR ROUTINE USE OF THE DHS PLATE IN THE TREATMENT OF TROCHANTERIC FRACTURES?

The transtrochanteric fractures can be divided according to AO classification as stable (AO Classification A1), unstable, with standard fracture pattern (AO Classification A2) and unstable with reverse oblique pattern (AO Classification A3). In types A1 and A2, the DHS plate, when compared to the cephalomedullary nails, provides similar

outcomes regarding time of surgery, time of radioscopy, blood loss, time of hospital stay, postoperative mobility, time of consolidation, loss of reduction, mortality and functional outcome^{15,16}(A). However, the DHS plate does not have the femoral diaphysis fracture as a complication, which is associated with the Gamma nail¹⁷(A). The DHS plate is also indicated for fractures types A1 and A2. As for fractures with reverse oblique patterns, such type A3, the use of cephalomedullary nails can be an advantage¹⁸(A).

IS THE DHS THE BEST FIXATION METHOD FOR STABLE TROCHANTERIC FRACTURES?

Other implants, such as Jewett nail plate or Ender nails show similar outcomes in the treatment of stable transtrochanteric fractures, with a failure rate of around 5%¹⁹(B).

DOES THE USE OF THE DHS COMPRESSION SCREW IMPROVE STABILITY AND PROMOTE THE CONSOLIDATION OF TRANSTROCHANTERIC FRACTURES?

The DHS compression screw, used after the implantation of the sliding screw and the angulated plate would have the purpose of promoting additional fixation stabilization, impacting the proximal and distal fragments of a transtrochanteric fracture. Patients with transtrochanteric fractures submitted to this type of osteosynthesis, with and without the use of the compression screw, did not have any advantages with its use, when treatment outcomes were compared. The use of the screw resulted in higher degree of migration and consolidation in varus, in women older than 80 years with osteoporosis. The use of this screw is not recommended for fixation of transtrochanteric fractures²⁰(A). The use of DHS compression screw is not indicated after the implant placement²⁰(A). Its use does not influence treatment outcomes and, moreover, its use in patients with osteoporosis can lead to migration of the sliding screw and consolidation in varus.

IN UNSTABLE TRANSTROCHANTERIC FRACTURES, IS FIXATION WITH ANATOMIC REDUCTION BETTER THAN OSTEOTOMY AND MEDIALIZATION?

Fixation techniques associated with valgus osteotomy and medialization were described by Dimon Hughston (1976) and Sarmiento (1970) to improve stability in unstable transtrochanteric fractures, at the time, using fixed angulated plates (such as Jewett's). Subsequently, with the introduction of dynamic systems (DHS plate-screw), the fixation started to incorporate such methods. The two possibilities for fixation (with anatomic reduction or with osteotomy) have similar outcomes regarding consolidation and functional recovery; fixations with osteotomy require longer surgical time and result in a larger volume of blood loss, with no impact on outcomes or complications²¹(A). In another study, a shorter hospital stay was observed, as well as better outcomes regarding functional recovery,

when the anatomic reduction was obtained²²(B). Considering these conclusions, no advantages were observed when performing osteotomies associated with osteosynthesis and their use is not recommended for unstable transtrochanteric fractures.

WHAT IS THE EXPECTED OUTCOME IN TROCHANTERIC FRACTURES TREATED WITH DHS PLATE?

After one year of surgical treatment with DHS, of both stable and unstable fractures, 69% of the patients are alive, of which 95% report no or mild pain, 85% return to the same accommodation and 50% return to the mobility level prior to the fracture. The rate of complications directly related to the surgical fixation is only 3.6%, leading to reoperation in 2.6% of the patients²³(B).

ARE THERE SITUATIONS IN WHICH THE NAILS CAN BE EMPLOYED WITH REAL ADVANTAGE WHEN COMPARED WITH THE TRADITIONAL DEVICES (DHS, FOR INSTANCE)?

The analysis of comparative studies shows outcomes that are favorable to both systems, but it must be observed that, in stable fractures, apparently there is no significant advantage between them²⁴(A); in unstable fractures, the cephalomedullary systems are more adequate; if it is necessary to perform an open reduction, the outcomes tend to favor the fixations with sliding nail-plate systems²⁴(A). Surgical time and bleeding are similar. Regarding the complications, the nails show a higher incidence of them²⁵(A), especially with associated diaphyseal fractures²⁶(A). There is evidence²⁴(A) that favors the use of cephalomedullary nails in fractures with reverse oblique pattern or unstable comminuted fractures¹⁶(A), type A3 or transtrochanteric fractures with intertrochanteric pattern. In these cases, the DHS plates offer a higher risk of complications¹⁶(A), and among them, the loss of fixation, delayed consolidation and frequent breaking²⁷(A). Even DCS plates have a higher incidence of complications than nails²⁸(A). The high cost of nails must be considered in stable fractures or those that can be fixated with conventional systems²⁹(A). The outcomes comparing nails such as Gamma nail and proximal femoral nail PFN are similar³⁰(A).

WHAT IS THE BEST FIXATION METHOD FOR REVERSE OBLIQUE PATTERN FRACTURES?

The treatment of unstable fractures with reverse oblique pattern of the proximal femur must be carried out in the same way as the treatment of subtrochanteric fractures³¹(A). The use of sliding screw-plate implants of the hip does not offer enough control for the diaphysis medialization tendency. The complementary use of a trochanteric support plate is recommended when using these systems to treat this specific fracture type³²(A). The use of plate systems with a fixed 95° angle constitutes a viable choice, either as the method of relative stability, adopting

the bridge principle in case of comminuted fractures, or the method of absolute stability, in cases of simple fracture pattern and anatomic reduction³³(B). The intramedullary implants constitute a safe alternative that can be used percutaneously and offer enough stability in diaphyseal medialization³¹(A).

IS IT NECESSARY TO PERFORM THE DISTAL LOCKING OF INTRAMEDULLARY NAIL IN THE TREATMENT OF TRANSTROCHANTERIC FRACTURES OF THE FEMUR?

Patients submitted to dynamic distal locking, with two screws in the diaphyseal region, when compared to patients submitted to static locking, after a mean follow-up of 37 months, showed better tolerance to locking and fewer cases of cortical hypertrophy (1 in 34 versus 6 in 30) at the implant extremity. The other complaints were similar with both types of locking³⁴(A).

WHEN IS THE USE OF EXTERNAL FIXATOR INDICATED IN THE TREATMENT OF PATIENTS WITH TRANSTROCHANTERIC FRACTURES OF THE FEMUR?

Regarding the indication of an external fixator for the treatment of transtrochanteric fractures, it can be stated that: the external fixator placed under general anesthesia can be a viable, safe and advantageous alternative for the treatment of patients with high surgical risk (ASA 3 or 4)^{35,36}(B). A fixator that uses hydroxyapatite-coated external-fixation pins can be considered an alternative to the sliding screw, with similar rates of mortality, morbidity a time of consolidation, as well as being lower-cost³⁷(B).

WHEN AND IN WHICH CONDITIONS CAN CONSERVATIVE TREATMENT STILL BE USED?

In the current conditions of surgical treatment, the conservative approach, with bed rest associated with early mobilization must be used only when it is impossible to perform the surgery, as the rates of mortality during the first 30 days can be 2.5-fold higher³⁸(B). The treatment with continuous traction, even skeletal traction, has poor outcomes regarding the mortality and defective consolidation. Reports of favorable outcomes after the conservative treatment can only be seen in older studies and there is no longer support for its use³⁹(B).

ARE THERE BENEFITS IN TREATING TRANSTROCHANTERIC FRACTURES WITH TOTAL HIP PROSTHESIS?

There are no advantages in total hip arthroplasty when compared to the internal fixation for the treatment of transtrochanteric fractures. There is no difference between the two forms of treatment in unstable fractures regarding outcomes, such as time of hospital stay, time to weight-bearing or complications. Patients treated with proximal femoral intramedullary nails have lower surgical time, lower blood loss, lower mortality rates and low-

er hospital costs, when compared to those treated with arthroplasty⁴⁰(A). Very elderly patients and with advanced osteoporosis, with complex unstable fractures of the proximal extra-articular region of the femur and who are eligible for early mobilization can benefit from the treatment with arthroplasty⁴¹(A).

WHAT IS THE MORBIMORTALITY OF TRANSTROCHANTERIC FRACTURES?

Transtrochanteric fractures are associated with high rates of morbidity and mortality. One year after the fracture occurrence, 20% of the patients have not reintegrated into their previous family and social life. Moreover, when comparing patients that suffered and did not suffer a fracture, the first group had three-fold higher healthcare costs within the first year of treatment. The mortality varies from 6% to 11% in the first month, 14% to 36% in the first year and is 15% higher than individuals at the same age range that did not suffer the fracture⁴²(A).

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