

SURGICAL TREATMENT OF THE TROCHANTERIC FRACTURES BY USING THE EXTERNAL AND INTERNAL FIXATION METHODS

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Summary. *Trochanteric fractures usually occur in older patients, who are more than 65 years old, with greater loss of the skeletal mass. Conservative methods of treatment are accompanied by the greater percentage of death cases; moreover, they do not render valid anatomical and functional results. Surgical treatment by using the dynamic implant presents a method of choice in the fixation of the trochanteric fractures. This paper surveys the treatment-results of the 110 patients, 61 of whom have throcanteric fractures, and have been operatively treated by the dynamic method of the internal fixation, whereas the remainder 49 patients have been treated by the method of the external fixation. Dynamical implants enable both dynamisation and compression of the fracture in the axial of the neck as well as the diaphysis of the femur, which lessens the occurring possibility of the mechanical complications, and, at the same time, enables the effective healing of the fracture, early activation and mobility of the patients who were operated. In patients infected by various diseases, for whom the surgical trauma presents a life treat, the external fixation has to be a method of choice.*

Key words: *Surgical treatment, trochanteric fractures, external and internal fixation*

Introduction

With the increase of the average life expectancy, the fractures of the proximal part of femur have been marked as one of the biggest problems of the contemporary civilization. The patients with this type of fracture occupy at least 30% of beds in the orthopedic institutions (1, 2, 3, 4) Trochanteric fractures are around four times more frequent than the fracture of the proximal part of femur, and they are a usual occurrence in older patients, above 65 years of age, when there is far greater loss of the skeletal mass (osteoporosis). Women are three times more liable to these types of fractures than men (5, 6). The treatment of the trochanteric fractures calls for the far more important investment of financial means. In SAD, around 340 000 fractures of the proximal part of femur are annually treated. Around 12.6 millions of dollars are annually spent on the treatment of the patients with the fracture of the proximal part of femur or 37 000 per fracture. In more than 90% of the cases, the fractures occur in patients who are more than 65 years of age. Around 200 to 250 patients with the fracture of the proximal part of femur are annually treated at the Orthopedic Clinic in Nish, and their treatment usually amounts to a considerable sum of 10 000 000 dinars (7). Trochanteric fractures present a huge life treat. If they are not adequately treated, they may cause a considerable change in the quality of life. The trauma becomes more acute causing the existing disease to get even worse, which results in great per-

centage of death cases (8). The application of the contemporary operational methods substantially lessens the death of patients, in comparison to the conservative methods of treatment; furthermore, they are accompanied by the fewer percentage of complications and valid functional result (3, 9). Orthopedic Clinic in Nish is engaged in conducting the biochemical researches of their own dynamic implants as well as their clinical application (3, 10). As a result of these researches, the regular clinical practice started to use the External fixator by Mitkovic (11) and the Dynamic internal fixator by Mitkovic (3, 10) (Fig. 1). They were dynamically implanted since they enable the dynamisation and compression of the fracture in the axial of the neck of femur and in the axial of the diaphysis of femur (Fig. 2, Fig. 3). This possibility of dynamisation and compression of the fracture enables a kind of certain and effective healing of the fracture with the minimal possibility of mechanical complication occurrences (7, 10).

Materials and methods

The prospective study presents the results of the treatment of 110 patients, 61 of whom had the trochanteric fracture and were surgically treated by the dynamic internal fixation method, whereas the remainder 49 patients were surgically treated by the dynamic external fixation method.

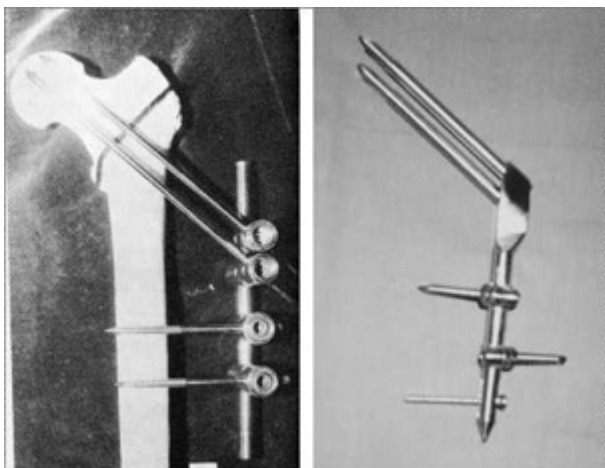


Fig. 1. Mitkovic's dynamic external and internal fixator

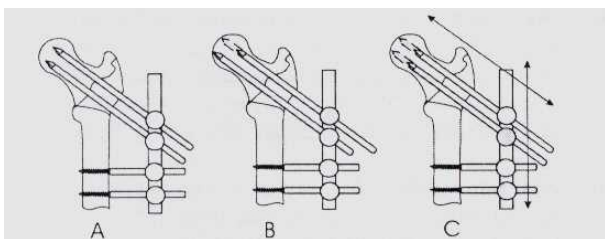


Fig. 2. Method of external fixation and dynamisation using Mitkovic's external fixator: a) external fixation of the trochanteric fracture; b) technique of dynamisation removing proximal pin for about 5 mm, while the first distal pin is fixed; c) proximal pin is fixed and distal clamp is unlocked during the removing of the corresponding pin for 5 mm

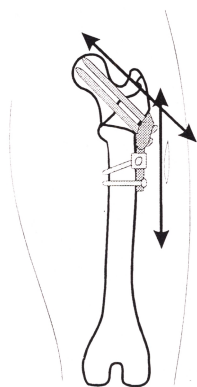


Fig. 3. Method of internal fixation and dynamisation using Mitkovic's dynamic internal fixator

All patients were operated at the Orthopedic-Traumatology Clinic of the Clinical Centre in Nis. The fractures were fixed by the Dynamic internal fixator by Mitkovic (Fig. 4) as well as the External fixator by Mitkovic (Fig. 5). Jensen-Michaelsen's modification of Evans classification (12) of the trochanteric fractures was used for the classification of these fractures.



Fig. 4. x-rays of unstable trochanteric fracture before and after the internal fixation with Mitkovic's dynamic internal fixator



Fig. 5. x-rays of trochanteric fracture before and after the external fixation

ASA score (8) was used for the estimation of the overall condition of the patients. The time of following the patients' conditions starts a year after the operation was carried out. The prompts that were followed: the average time of operation, the average length of the operational cut (when the internal fixator is applied), mechanical complications, the average radioscopic exposition during the operational period, the need for the blood transfusion during the operation, prophylactic use of antibiotics, the average duration of the hospitalization, post-operational infections and mortality. The ultimate functional results were shown according to the modified scale by Merle d'Aubigneu (3).

Results

Out of 110 patients with the trochanteric fractures, 61 were operated using the method of the dynamic internal fixation, while the remainder 49 patients were treated by the method of the external fixation. The average age in the first group was 73.66 years, and in the second 76.4 years. In the first group, 79.86% of the patients had one or more diseases, whereas in the group

with the patients operated by the method of the external fixation, 83.86% of them had a certain kind of disease. In the first group, 70.49% of patients were injured by their unstable fracture, while in the second group there were even 78% unstable throchanteric fractures. Women comprised 59.01% in the first and 55.31% in the second group. At their admission, all patients had the skeletal traction placed through tuberositas of tibia. All of them were operated on from 48 to 120 hours after the admission. The average length of the skin incision in patients, operated by the method of internal fixation was 10.83 cm. The average time of the radioscopic exposition in both groups of the operated patients is 12.5 seconds. The average length of the internal fixation is 42.5 min, whereas it amounts to 21 minutes in the case of the external fixation. During the operation of the internal fixation the blood transfusion was given to 47.54% of the patients, while in the second group of patients operated by the method of external fixation, 14.5% of them received blood transfusion. 95% of the patients operated by the internal fixation and 30.4% of those operated by the external fixation were given antibiotic for the prophylactic purposes. There were 3.27% of the mechanical complications in the first group and 2.04% in the second group. The average time period of hospitalization after the internal fixation was 9.65 days, and 6.7 days after the external fixation. After the internal fixation, there occurred 1.63% of infections, and after the external fixation their number was 2.04%. In the first group of patients there were no infections on the surface. After the external fixation, 7.21% of the infections on the surface were visible around the pins of the apparatus. A year after the internal fixation mortality was 14.75%, and after the external fixation it was 19.45%. The ultimate functional results after the internal fixation are: excellent 59.16%, good 34.61%, moderate 5.76% (Chart 1).

The ultimate functional results a year after the external fixation are: excellent 39.19%, good 43.25%, moderate 12.16% and bad 5.4% (Chart 2).

Discussion

In the course of aging there occurs the reduction of the bone-volume (osteoporosis), and the increase of the number of patients with the fracture in the hip area (5, 6). With the advances in age, there is an increase in the number of already existing diseases; what is more, there is also an increase in the number of trochanteric fractures as well as in the mortality level. The treatment requires considerable financial means, a great part of the hospital capacity is full with the patients having the fracture of the trochanteric region (4, 14, 15) - a huge number of orthopedic surgeons and medical staff is preoccupied with this problem. In the recent years the great efforts have been put into finding an effective and cheap way of curing these fractures (9). Prevention is certainly very important feature; it is reflected in the treatment of osteoporosis and in the carrying of the protective means (hip protector systems) (16). The fractures are treated conservatively and operatively. Conservative methods of treatment do not render valid anatomical and functional results. Fractures heal in varus position as well as in the external rotation with the considerable leg shortage. The mortality level is quite big (17) - up to 40%. Those patients are confined to bed, contrary to the contemporary aim of treatment which requires the early activation and mobilization of the patients. This may be achieved only by early surgical intervention. Over one hundred implants in the world are actually for the fixation of the throchanteric fractures. The Dynamic implants such as Dynamic hip screw (18, 19) and intramedular Gamma locking nail (20) are the most contemporary ones. These implants enable the fracture compression and dynamisation in the femoral neck axis. The kind of implants that enable the compression and dynamisation of the fracture in the axial of the neck of femur as well as the axial part of the diaphysis are not very common. As a result of the biomechanical research that has lasted for several years as well as the clinical application of their own implants, Orthopedic Clinic in Nish gets itself into line with those institutions which use in their treatments the most contemporary dynamic implants. These implants are: the Dynamic internal fixator by Mitkovic and the External fixator by Mitkovic (1, 2, 3, 7, 10, 11). The dynamisation and compression of the fracture fixed by the Dynamic internal fixator is secured by the constructional solutions of the implant itself, whereas the dynamisation of the fracture fixed by the external fixator is made possible by the mere pulling of the proximal pins for about 5 mm (in the axial of the neck femoris), and by unlocking of the distal clamps (in the axial of the diaphysis). The dynamisation and compression of the fracture enable certain and safe healing of the fracture, accompanied by the minimal possibility of mechanical complications development (dezintegration, falling out of pins, head perforation, banding or bursting

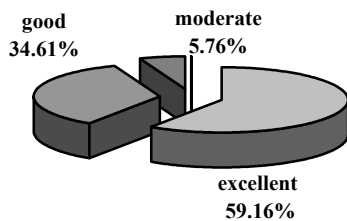


Chart 1. The ultimate functional results after the internal fixation

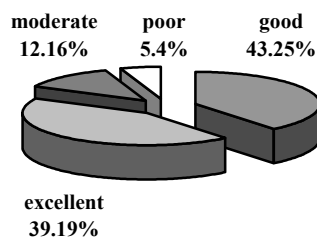


Chart 2. The ultimate functional results after the external fixation

of the implants). According to the results of the clinical application of the Dynamic internal fixator compared with the results of Medoff sliding plate (21) (the only implant with the same biochemical characteristics with the worldwide application), we may clearly observe that the clinical treatment of trochanteric fracture with our dynamic implant is certainly a method, both effective and contemporary. In patients burdened by the systemic diseases, for whom the surgery presents a great risk as well as the life threatening venture, there is a need for the short-lasting intervention that will alleviate the nursing, enable activation and weight bearing on the operated leg. The external fixation is a minimal surgical intervention for the highly-risked patients (22, 23). This method is simple, safe, short-lasting, economical, with no blood loss and consumption of antibiotics for the preventing purposes. The patients operated by the method of external fixation are, at average, older than the patients in whom the fractures are fixed by the method of internal fixation. With the age advance, the number of present diseases as well as the unstable fractures increases too. ASA score in this group of patients is 3 and 4. The length of the operation in patients operated by the method of external fixation is considerably shorter ($p < 0.001$); these group of operated patients receives far less intra-operative transfu-

sion ($p < 0.001$) as well as antibiotics for the preventive purposes ($p < 0.001$). Post-operative hospitalization is short-lasting ($p < 0.001$), while the activation starts immediately after the operation is terminated. The disadvantage of this method is the possibility of infection around the pins of the fixator ($p < 0.05$) as well as the need for the regular bandaging around the pins (once a week). This method may be restricted in corpulent patients due to the far greater possibility of infection occurrences around the pins (11).

Conclusion

Surgical treatment is a method of choice during the treatment of the trochanteric fractures. The dynamic internal fixation is easy to perform; the method itself is minimally invasive while the periosteal vascularization remains intact. The percentage of the mechanical complications is minimal thanks to the double dynamisation which enables effective and certain healing of the fracture. The implant assures early activation and mobilization of the operated patients. In case of treatment of the highly risked patients, the external fixation is recommended as a minimal surgical intervention that enables early activation as well as mobilization of the patients.

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HIRURŠKO LEČENJE TROHANTERNIH PRELOMA DINAMIČKIM METODAMA SPOLJNE I UNUTRAŠNJE FIKSACIJE

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Kratak sadržaj: Trohanterni prelomi nastaju najčešće kod bolesnika starije životne dobi, iznad 65. godina, kod kojih postoji veći gubitak koštane mase (osteoporoza). Konzervativne metode lečenja su praćene velikim procentom smrtnosti i ne daju dobre anatomske i funkcioanalne rezultate. Hirurško lečenje dinamičkim implantatima predstavlja metod izbora u fiksaciji trohanternih preloma. U radu se prikazuju rezultati lečenja 110 bolesnika, 61 sa trohanternim prelomima lečenih operativno metodom dinamičke unutrašnje fiksacije i 49 bolesnika lečenih metodom spoljne fiksacije. Dinamički implantati omogućavaju dinamizaciju i kompresiju preloma i u osi vrata i dijafize femura, što smanjuje mogućnost nastanka mehaničkih komplikacija, a istovremeno omogućava sigurno i efikasno zarastanje preloma, ranu aktivaciju i mobilizaciju operisanih bolesnika. Kod bolesnika koji su opterećeni bolestima, kod kojih hirurška trauma predstavlja opasnost po život, spoljna fiksacija je metoda izbora.

Ključne reči: Hirurško lečenje, trohanterni prelomi, spoljna i unutrašnja fiksacija