*Daniel Kowalski, Magdalena Pieniężna-Ćwirko, Rafał Kamiński, Piotr Zakrzewski, Stanisław Pomianowski, Marcin Wąsowski

New trends in fracture fixation in elderly patients

Nowe trendy w zaopatrywaniu złamań u chorych w podeszłym wieku

Department of Traumatology and Orthopaedics, The Medical Centre of Postgraduate Education, prof. Adam Gruca Hospital, Otwock
Head of Department: prof. Stanisław Pomianowski, MD, PhD

Summary

With the aging of the population it becomes more and more challenging to treat osteoporotic fractures. The so-called osteoporotic fractures include compression fractures of thoracic and lumbar vertebrae, fractures of the distal radius, fractures of the proximal femur and humerus. Applied over the years the conservative therapy is gradually being replaced by surgery. Such a situation is affected by: continuous improvement of surgical techniques, including modern shoulder arthroplasty and hip joints, osteosynthesis technique allowing a stable fixation of bone fragments of reduced bone mineral density, minimally invasive surgical techniques, and improved perioperative anesthesia care. The benefits of reducing the duration of treatment and recovery of patients are: a quick return to independence, reducing pressure on the environment of the patient, as well as an economic factor, which shows that early and properly performed surgery with a short hospital stay in the surgical ward is cheaper than conservative long-term treatment with specialist care and nursing, repeated radiological examinations, transport, outpatient controls etc.

Key words: osteoporotic fracture, osteosynthesis, trochanteric fracture, LISS method

Streszczenie

Wraz ze starzeniem się społeczeństwa coraz częstszym wyzwaniem staje się leczenie złamań osteoporotycznych. Do tzw. złamań osteoporotycznych zaliczamy: złamania kompresyjne trzonów kręgów piersiowych i lędźwiowych, złamanie końca dalszego kości promieniowej, złamanie końca bliższego kości udarowej i ramiennej. Stosowane przez lata leczenie zachowawcze i czynnościowe stopniowo wypierane jest przez leczenie operacyjne. Na taki san rzeczy wpływ ma: ciągłe udoskonalanie technik operacyjnych, w tym nowoczesna endoprotezoplastyka stawów ramiennego i biodrowego, techniki osteostyntezy pozwalające na stabilne zespolenie odłamów kości o zmniejszonej gęstości mineralnej, techniki operacyjne małoinwazyjne, oraz poprawa okołooperacyjnej opieki anestezjologicznej. Korzyści płynące ze skrócenia czasu leczenia i rekonwalescencji chorych to: szybki powrót do samodzielności, zmniejszający presję na otoczenie chorego, oraz czynnik ekonomiczny, z którego wynika, że wcześnie i prawidłowo przeprowadzone leczenie operacyjne z krótki czasem hospitalizacji w ramach oddziału zabiegowego jest tańsze od długotrwałego leczenia czynnościowego lub zachowawczego z wielodniową opieką specjalistyczną i pielęgnacyjną, powtarzanymi badaniami radiologicznymi, transportem chorego na kolejne kontrole ambulatoryjne etc.

Słowa kluczowe: złamanie osteoporotyczne, osteosynteza, złamania krętarzowe, metoda LISS

INTRODUCTION

Osteoporosis is a systemic skeletal disease, frequently associated with elderly persons, that manifests with a decrease of the bone mass, abnormal microarchitecture of the bones and results in increased risk of fracture occurrence. In the practice of an orthopaedic and a trauma surgeon, the most important factors that are common for senile and post-menopausal osteoporosis, include: decreased mineral density of the bones (especially the spongy bones), advanced biological age of the patient, frequent presence of coexisting diseases of the circulatory system, the respiratory system and the nervous system, hormonal abnormalities, decreased general efficiency and fitness. The so-called osteoporotic fractures include: compression fractures of the thoracic and lumbar vertebrae, distal

radial fractures, as well as proximal femoral and humeral fractures (1). Applied over the years, the conservative therapy is gradually being replaced by surgery. Conservative and functional treatment remains the gold standard in treatment of fractures of the spine and the upper limb, and surgical treatment of the femoral fractures (2). However, in justified cases, all listed damages of the motoric system may be treated with surgical methods. Modern surgical techniques facilitate early return to movement, which allows managing patients without immobilization of the operated region in plaster casts, which are especially troublesome for elderly people.

FRACTURES OF THE PROXIMAL FEMUR

Within the proximal femur, we distinguish femoral neck fractures and trochanteric fractures. In accordance with the recommendations of the Polish Society of Orthopaedics and Traumatology, which were binding over the years, femoral neck fractures were treated according to the rule that each patient has the right to spare his/her own hip joint, i.e. the objective was to perform surgical fixation and obtaining union within the area of the femoral neck. Such management required from the patient not to bear weight on the operated limb over a few weeks (or rather a few months, i.e. from 3 to 6 months), i.e. moving with assistance of elbow crutches or a walking frame. In practice, the total elimination of weight bearing by the operated lower limb in elderly and senile patients is possible only as a result of a ban of rising to a standing position. Such management favours development of such complications as: bedsores, urinary tract infections, respiratory tract infections, further worsening in efficiency and fitness, acceleration in lowering mineral density of the bones. It is also worth emphasizing that in a vast majority of cases, a specific blood supply to the femur within the area of its neck results in failure in an attempt to obtain bone union or it may lead to aseptic necrosis of the femoral head. Bipolar hip hemiarthroplasty seems to be a beneficial solution in femoral neck fractures in elderly patients. Significant advantages of this therapeutic method include: possibility of weight bearing by the operated limb from the first day after surgery, no necessity to surgically prepare the acetabulum, which shortens duration of the surgical procedure and lowers blood loss and a lower risk of joint dislocation comparing to total hip arthroplasty. Additionally the bipolar alloplasty shows no tendency of painful protrusion of the endoprosthesis head into the acetabulum, which is characteristic for the Austin-Moore hemiprosthesis (3) (fig. 1).

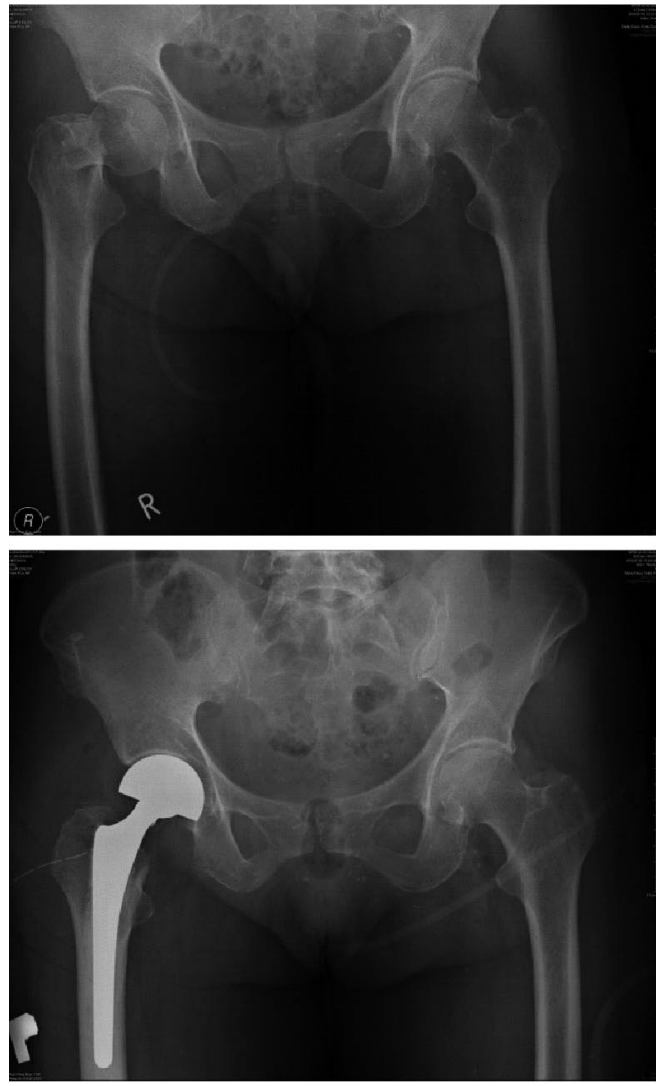

Fig. 1. Radiograms of the pelvis: preoperative with visible right femoral neck fracture and postoperative after bipolar cemented alloplasty.

In principle, trochanteric fractures of the femur have been surgically treated for years. However, for a decade, an osteosynthesis method has been available, that may be recognized as the optimum method. It is the intramedullar fixation by the Gamma nail. It is charecterised by:

- an exceptionally high stability of the fixation, which allows rising to a standing position and weight bearing of operated limb before the bone union occurs,
- minimal invasiveness of the procedure – 3 skin cuts measuring approximately 4, 2 and 1 cm in length for performing closed reposition and fixation of the bone fragments,
- minimal intraoperative blood loss.

It is extremely important that weight bearing and exercising of the operated limb is possible from the first day post-op. The small surgical approaches significantly lower the risk of infectious complications in elderly patients. Those patients frequently use diapers, are uncared-for, or have a tendency to remove dressing from the postoperative wound due to senile dementia.

The friendly fixation system allows performing the surgery within approximately 30 minutes (4) (fig. 2).

Osteoporotic fractures in the upper limb and spine

As it was mentioned at the beginning, other osteoporotic fractures are most frequently treated by conservative and functional methods:

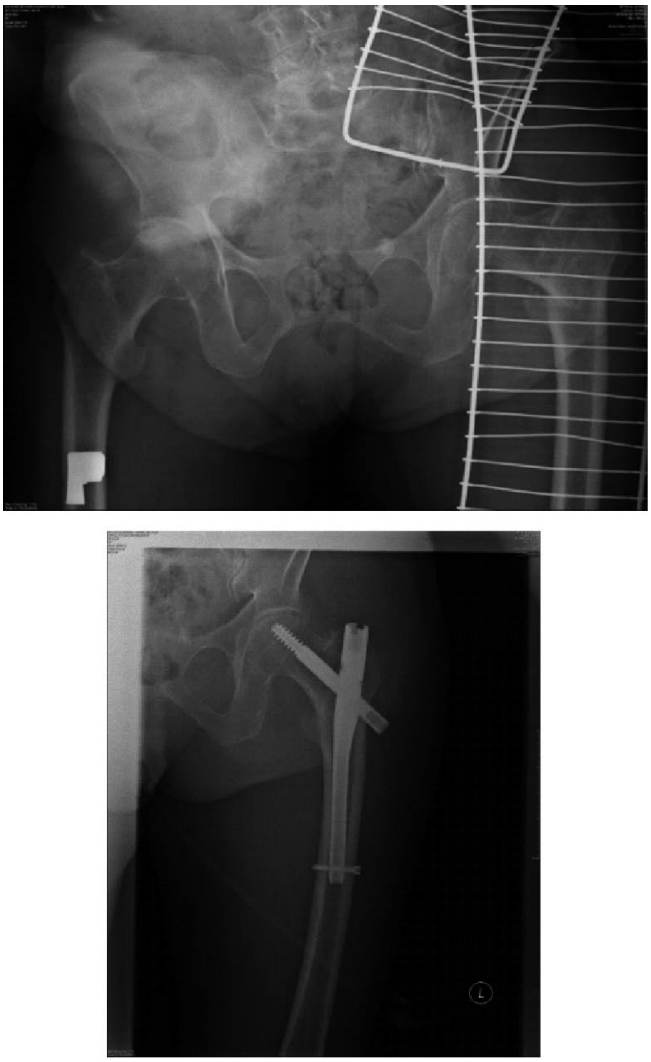

Fig. 2. Intertrochanteric fracture of the left femur – preoperative radiogram and postoperative radiogram after surgical fixation with an intramedullary Gamma nail.

Fig. 3. The distal radial fracture; unsuccessful closed reduction of the fracture and immobilization in a plaster cast; corresponding image made after surgical reduction of the fracture and fixation with a locking palmar plate.

- compression fractures of the vertebrae – by back braces and back support belts,
- distal radial fractures – by closed reduction and immobilization in a plaster cast (in case of secondary displacements or exceptionally unstable fractures – additionally fixed by a percutaneous insertion of Kirschner wires),
- proximal humeral fractures – by immobilization in a plaster cast or Desault bandage and early non-weight bearing exercises and passive motion exercises after recession of the acute pain phase.

However, in justified cases, in case of general and local contraindications for immobilization, and due to individual indications for surgical treatment, there are modern surgical treatment methods available for the aforementioned osteoporotic fractures. Fixation with locking plates (i.e. screws, which are fixing the plate to the bone are locked in the plate with their thread, simultaneously being anchored in the bone fragments in various angles) allow the postoperative management of patients without immobilization of the operated limb, early beginning of motoric and functional rehabilitation, despite low mechanical durability of the bone tissue (5) (fig. 3 and 4).

COMPRESSION FRACTURES OF THE SPINE

A separate problem is associated with the compression fractures of the thoracic and lumbar vertebrae. Gradual lowering of the vertebral trunks in the thoracic and lumbar vertebrae leads to an excessive deformation of the spine with significant shortening of the anterior column, which creates a so-called dowager's hump, and secondary fractures of the inferior ribs resting on the ala of the ilium. This process is accompanied by severe, chronic pain syndromes. Unfortunately, the existing surgical treatment methods for osteoporotic compression fractures of the spine, including vertebroplasty and kyphoplasty, are performed in few centres in Poland, which results in insufficient availability of these methods. Both aforementioned treatment methods are performed under local anaesthesia supported by intravenous premedication. Vertebroplasty is an insertion of bone cement into the vertebral trunk after an osteoporotic fracture; such specific cement filling prevents further damage of the vertebra by strengthening its structure. Kyphoplasty allows

Fig. 4. Fracture of the head and surgical neck of the right humerus – unfavourable position of the bone fragments, visible immobilization in a Desault plaster cast; the postoperative radiogram presents anatomical reduction of the bone fragments and fixation with a Philos locking plate.

reconstructing normal anatomical structure by possible intraoperative partial reconstruction of the vertebral trunk height using an expandable balloon inserted into the vertebral trunk. Within the postoperative period, immobilization of the operated segment of the spine is not required (6) (fig. 5 and 6).

FRACTURES OF THE PROXIMAL TIBIAL

The proximal tibial fracture does not belong to the so-called osteoporotic fractures; however, in the routine practice of the trauma surgeon, it is frequently diagnosed in elderly patients. This fracture most frequently occurs as a result of rapid increase in weight bearing by the proximal tibial epiphysis in case of a valgus positioning of the knee joint, e.g. as a result of fall from a step.

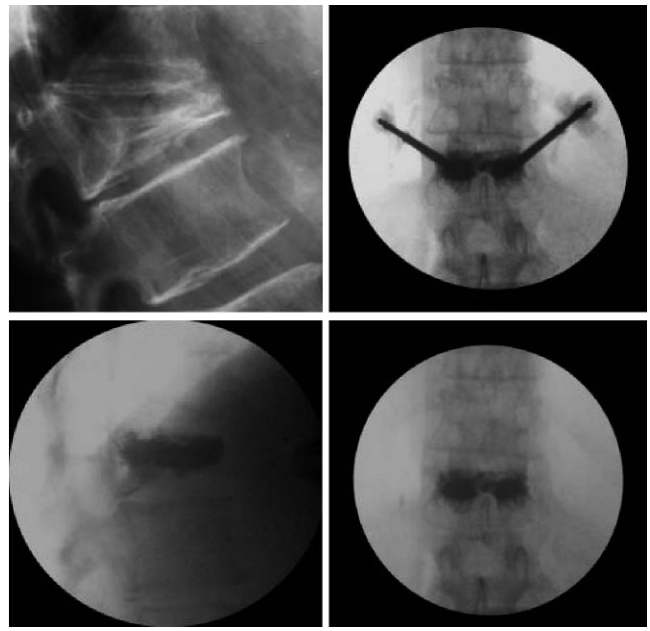

Fig. 5. Vertebroplasty; condition before and after insertion of the bone cement into the vertebral trunk.

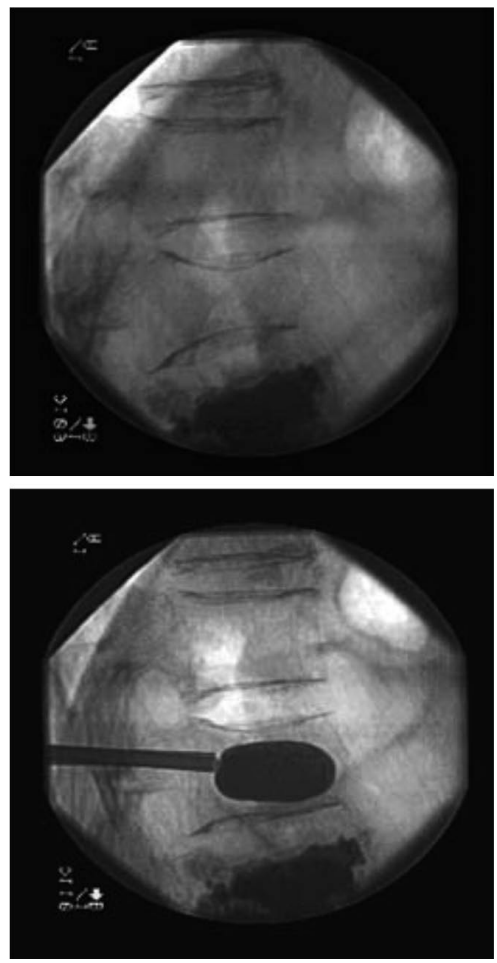

Fig. 6. Kyphoplasty; visible partially reconstructed height of the operated vertebral trunk after filling the balloon with the bone cement.

In case of a dislocation of the bone fragments, the purpose of the surgical treatment is to reconstruct the correct anatomical structure of the joint and to fix the

bone fragments. The so-called "osseous suture", using spongy screws, is the most common fixation method used for years. However, within the postoperative period, this method requires immobilization in a plaster cast over the period of at least 6 weeks. For a few years, so-called LISS methods have become more and more common. These techniques facilitate performing surgical procedures with significantly smaller surgical access and ensure higher stability of the fixation, which leads to shortening or eliminating of immobilization of the lower limb in a plaster cast (fig. 7).

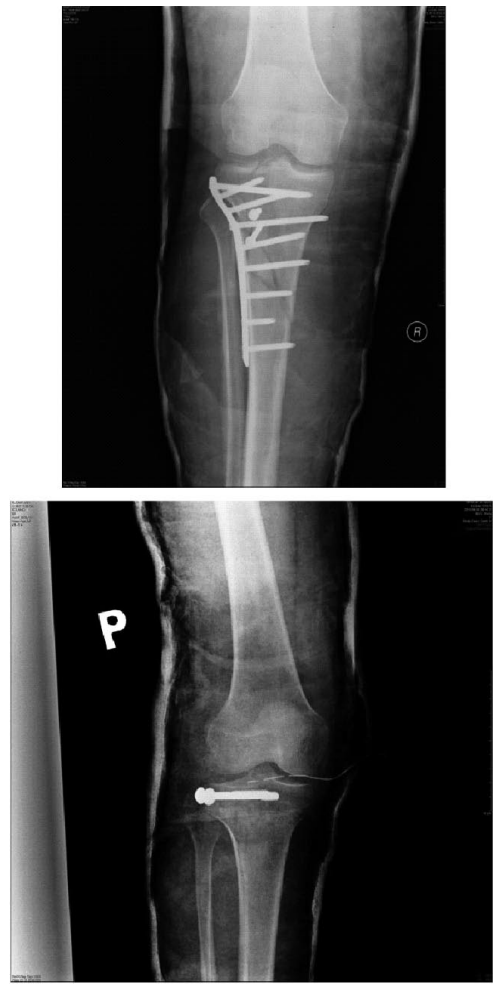

Fig. 7. Fixation of the proximal tibial fractures with a LISS plate (at the left) and with osseous suture method – screws (at the right).

SUMMARY

Osteoporotic fractures are a common problem for an orthopedic surgeon – traumatologist. In recent years, much has changed in the standards of treatment of such fractures. Increasingly the conservative therapy is being replaced by surgical procedures. This is due to the continuous improvement of surgical techniques – modern shoulder and hip joint replacement, osteosynthesis techniques allowing stable fixation of bone fragments with reduced bone mineral density and improved perioperative anesthesia care. This is influenced by the benefits of the shortening of the time of treatment and recovery of patients, and a quick return to the patient's autonomy. Not without significance is the economic factor, which shows that an early and properly performed surgery with a short hospital stay in the surgical ward is cheaper than long-term functional treatment or conservative treatment with specialist and nursing care, repeated radiological examinations, transport of the patient to outpatient control etc.

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Address/adres:
*Daniel Kowalski
Department of Traumatology and Orthopaedics
Medical Centre of Postgraduate Education
ul. Konarskiego 13, 05-400 Otwock
tel.: +48 (22) 779-40-31
e-mail: danielkowalski@gazeta.pl