Factors affecting quality of care for elderly subjects undergoing surgery for hip fracture: review of the literature

V. Merle 1, L. Moret 5, V. Josset 1, L. Pidhorz 6, G. Piétu 7, F. Gouin 6, F. Riou 9, P. Chassagne 4, J. Petit 3, P. Lombra 1, P. Czernichow 1, F. Dujardin 2

1 Département d’Épidémiologie et de Santé Publique, CHU de Rouen, Hôpitaux de Rouen, 1, rue de Germont, 76031 Rouen Cedex.
2 Département d’Orthopédie-Traumatologie et de Chirurgie Plastique, CHU de Rouen, Hôpitaux de Rouen, 1, rue de Germont, 76031 Rouen Cedex.
3 Délégation à la Qualité, CHU de Rouen, Hôpitaux de Rouen, 1, rue de Germont, 76031 Rouen Cedex.
4 Service de Gériatrie Aiguë, CHU de Rouen, Hôpitaux de Rouen, 1, rue de Germont, 76031 Rouen Cedex.
5 Service d’Orthopédie, Centre Hospitalier du Mans, 194, avenue Rubillard, 72037 Le Mans Cedex.
6 Pôle Information Médicale, Evaluation et Santé Publique, CHU de Nantes.
7 Pôle Urgences, CHU de Nantes.
8 Pôle Ostéo-articulaire, CHU de Nantes.
9 CHU de Rennes.

ABSTRACT

Hip fractures are one of the leading causes for admission of elderly subjects to healthcare facilities. Because of population aging, the incidence of hip fractures has increased considerably over the last years and will continue to increase in industrialized countries. Hip fracture in an elderly subject may be life threatening and has a significant functional and social impact not only because of the fracture itself, but also because of the risk of complications related to the patient’s health status and the long hospital stay.

The purpose of this work was to identify in the published literature professional practices, excepting surgical procedures, associated with better early and long-term outcome in elderly patients with hip fracture.

Questions raised concerning the patient’s hospital stay include factors related to the preoperative phase (time to surgery, usefulness of traction), the operation itself (antibiotic prophylaxis, anesthesia technique), and the postoperative phase (prevention of venous thrombosis, malnutrition, episodes of confusion, duration of indwelling bladder catheter, correction of anemia, geriatric care during the stay in the orthopedic ward, early and intense rehabilitation, prevention of recurrence). Among these factors, several appear to be associated with better outcome, including long-term outcome — surgery as early as possible in light of the patient’s general status, antibiotic prophylaxis in accordance with standard recommendations (SFAR, French society of anesthesiology and intensive care), prevention of venous thrombosis with low-molecular-weight heparin initiated at admission and associated with elastic contention. Oral nutritional support is probably beneficial and should be proposed for all patients. Particular attention must be given to prevention of confusion in order to reduce the rate of institutionalization. The rhythm of rehabilitation exercises should be at least five sessions per week. Finally, there are several methods, which are effective in preventing recurrence, taking into account osteoporosis, risk of falls. Preventive measures should be instituted for all patients undergoing surgery for hip fracture.

Key words: Hip fracture, quality of health care, outcome and process assessment (health care).
INTRODUCTION

Hip fractures are increasingly frequent in elderly subjects and, according to the DREES study (1) are the most frequent reason for admission to healthcare facilities in France, affecting 11/100 females aged 75-84 years and 33/1000 beyond the age of 85 years. As the population ages, the incidence of hip fractures can be expected to increase exponentially in industrialized countries in the upcoming years [Papadimitropoulos et al. (2)].

A hip fracture is always a serious event. It may be life threatening and has a considerable functional and social impact since only half of patients recover their prior level of independence [Magaziner et al. (3)]. This poor prognosis appears to be related to the patients’ general status before the fracture rather than the gravity of the fracture itself [Czernichow et al. (4)].

Care for patients admitted to hospital for hip fracture has two objectives which must be achieved simultaneously: treatment of the acute injury and preservation of the patient’s independence by preventing complications related to the pathological situation and long hospital stay. These objectives must be kept in mind throughout the hospital stay in the different units: emergency ward, orthopedic surgery, follow-up ward and rehabilitation. All healthcare professionals — emergency specialists, surgeons, anesthesiologists, geriatricians, rehabilitation specialists, nurses, physical therapists, social assistants, dietitians, etc. — should participate in the multidisciplinary management scheme.

In this context, it seems important to identify professional practices associated with better survival and functional outcome, less frequent iatrogenic accidents, and patient and familial satisfaction.

The purpose of this work was to identify in the literature professional practices, excepting the surgical procedure itself, which are associated with better survival and good short- and long-term functional outcome in elderly patients treated for hip fracture.

MATERIAL AND METHODS

Prerequisites

We searched for articles which identified phases of management having an impact on prognosis. The result could be short-term outcome (mortality and complications during hospitalization, pain) or long-term outcome (mortality and post-hospital complications, mobility and independence late after surgery). We searched for phases where medical intervention has a direct impact. Specifically, we did not study the influence of pre-hospital care, nor the type of fracture.

Since the population concerned by hip fractures is old or very old, associated pathological conditions are frequent. Schematically, two methods were used by the cited studies to take into consideration “poly-morbidity”: randomized studies or multivariate analysis with adjustment for co-morbid conditions. This latter method provides good results, but requires high-quality data on associated pathological conditions. The type of study (randomized or multivariate analysis) was noted for presentation of the results.

Our objective was not to perform a meta-analysis, but rather to review published data, and, if possible, to establish consensus recommendations.

Search for articles

We conducted a search using the Medline and Cochrane Central Register of Controlled Trials for articles published from 1993 to 2003 using the following key words: hip fracture, femoral neck fracture, quality of health care, outcome assessment (health care), outcome and process assessment (health care), treatment outcome. This research yielded 1613 articles listed in the Medline database and 181 in the Cochrane Central Register of Controlled Trials. This initial search enabled us to identify management items probably having an impact on the short- and long-term outcome. A second search was then conducted for the period 1966-2003 for each item, by combining the corresponding key word(s) with hip fracture or femoral neck fracture. We also identified a few pertinent articles in the list of the references cited by the articles identified with the Medline or Cochrane searches.

Article selection

We retained for analysis 145 original articles, meta-analyses, or reviews of the literature devoted to adults aged 65 years or more which had been published in English or French between 1975 and 2003.

RESULTS

Preoperative phase

When should patients undergo surgery for hip fracture?

Parker and Pryor (5), Rogers et al. (6), Laberge et al. (7), and Zuckerman et al. (8) demonstrated that late surgery in old bedridden patients with a high risk of decubitus complications was associated with longer hospital stay, less favorable functional result, and higher rate of infection and death. It is thus standard practice to recommend surgery as early as possible. However, in a recent report by Grimes et al. (9), a longer wait for surgery was not found to be associated with mortality. In this study, among the active medical problems, only development of decubitus scars was associated independently with “late” surgery.

Inversely, undertaking surgery early before the acute medical problems have been resolved is also associated with higher mortality [Kenzora et al. (10)]. Zuckerman et al. (8) observed that the association of high mortality with late surgery for hip fracture was no longer significant after adjustment for co-morbidity. In all probability, surgery is undertaken a few days later in patients with other medical conditions.
problems which have to be resolved. However, presence of medical complications is not the only reason for waiting. Laberge et al. (7) compared management practices for hip fracture in three different hospitals in Canada and found that health status at admission explained very little of the variance of waiting time (3%) compared with differences between hospitals (25%). This suggests that local management practices have an important impact on waiting time, although very little data is available on non-medical reasons for waiting longer before surgery. In light of these different elements, it is generally accepted that if the patient’s medical status is satisfactory, hip fracture surgery should be performed within 48 hours of admission [Zuckerman et al. (8), Huddleston and Whitford (11), Lichtblau (12), Morrison et al. (13)]. When a hip fracture patient has acute medical problems at admission (recent stroke, unstable angina pectoris or recent myocardial infarction, hypoxia or infection), Huddleston and Witford (11) recommend waiting until the medical problem is under control and fluid and electrolyte anomalies are corrected.

It is also noteworthy that anticoagulation with ticlopidine anti-platelet agents is not cited in the North American studies as a contraindication for early surgery while in France, the standard precautions for use of this anti-platelet agent contraindicate surgery. The French society of anesthesia and intensive care (SFAR) [Samama et al. (14)] recognizes the higher risk of hemorrhage during hip surgery in patients taking aspirin but does not recommend retarding surgery until bleeding time returns to normal. According to the SFAR, unlike ticlopidine or clopidrogel, aspirin is not a contraindication for epidural anesthesia.

Should traction be instituted before surgery?

Many orthopedic-traumatology units use traction regularly to relieve preoperative pain and facilitate reduction at surgery [Billsten et al. (15)]. Skin (with or without glue) or transosseous traction can be used. In their recent review of the Cochrane database, Parker and Handoll (16) found six randomized studies comparing series of adult patients with and without traction before hip fracture surgery and one study comparing skin traction versus transosseous traction. Two studies reported greater pain relief at rest in patients under traction; in one of them [Rosen et al. (17)] the difference in pain relief was minimal (2.82 versus 1.76 on a visual analog scale for pain the day after institution of traction); in the other [Draper and Scott (18)], the degree of pain was not noted. In three of the six studies [Draper and Scott (18), Anerson et al. (19), Jerre et al. (20)], patients under traction were given higher doses of analgesics than the patients without traction; in the other three studies [Rosen et al. (17), Finsen et al. (21), Needoff et al. (22)] there was no difference in analgesic doses between the two study groups.

Fracture reduction was studied in four trials; none of these trials has demonstrated that traction had a beneficial effect on reduction in terms of facility or anatomic quality [Anderson et al. (19), Jerre et al. (20), Finsen et al. (21), Needoff et al. (22)].

Summarizing, these different studies do not provide conclusive evidence in favor of traction, irrespective of the method used. At the present time, there is no evidence arguing for or against preoperative traction, which has been shown to be painful using the transosseous method [Rosen et al. (17), Resch and Thorgren (23)]. Use of locoregional analgesia could be helpful in reducing the pain of the installation and improve the advantage/disadvantage ratio of transosseous traction.

Surgical procedure

Is antibiotic prophylaxis useful?

The usefulness of antibiotic prophylaxis in patients treated for hip fracture has been demonstrated. Several meta-analyses have concluded that about 40% of operative site infections can be prevented with antibiotic prophylaxis [Boyd et al. (24), McQueen et al. (25), Hjortrup et al. (26)]. There is also general agreement on the antibiotic to use: unless there is a context of allergy, a first or second-generation cephalosporin should be prescribed as routine practice. For patients with identified or suspected meta-resistant Staphylococcus aureus (MRS), certain authors propose vancomycin despite the risk of emergence of intermediate vancomycin-resistant strains in the patient or other patients (cross transmission). This risk has never been demonstrated (short follow-up in published studies), but is sufficiently serious to avoid using vancomycin for routine prophylaxis and reserve it for patients with identified MRS.

There is no evidence demonstrating a benefit with repeated doses of antibiotics versus a single dose. It is thus reasonable to abide by the guidelines of the SFAR and use a single dose which should be administered 1.5 to 2 hr at most before the operation, taking into account the kinetics of the antibiotic in order to obtain a sufficient concentration at the operative site at the time of the incision [Classen et al. (27), Buckley et al. (28), Gatell et al. (29), Garcia et al. (30), Karachalios et al. (31)]. This protocol should be used except for abnormally long operations where a second dose can be administered during the operation. Antibiotic prophylaxis does not have to be continued after completing the operation.

Should locoregional or general anesthesia be used?

There is considerable controversy over the choice of locoregional versus general anesthesia. The meta-analysis reported by Sorensen and Pace (32) concluded that complications occur less frequently in patients given locoregional anesthesia. Studies reported to date on this topic can be criticized because of the lack of randomization. The many non-randomized studies with results adjusted for co-morbid conditions and functional status [Gilbert et al. (33), O’Hara et al. (34)] or comparing groups matched for these criteria [Koval et al. (35)] have not demonstrated any difference in...
mortality or hospital complications between the locoregional and general anesthesia groups. Gilbert et al. (33) did not find any difference in functional outcome. Urwin et al. (6) published a meta-analysis and Parker et al. (37) reported on controlled trials. These authors concluded that the frequency of thrombotic events is lower in patients operated on under locoregional anesthesia while those given general anesthesia have a shorter operating time.

Overall, there does not appear to be any strong argument favoring systematic use of general or locoregional anesthesia. The risks of each technique must be assessed for each individual patient in order to opt for the more appropriate method.

Postoperative phase

What method should be used to prevent thrombotic events?

Thromboembolic events are a frequent complication in patients undergoing hip surgery. If preventive measures are not taken, one out of two will experience a thrombotic event [Jorgensen et al. (38)] with 14% developing pulmonary embolism [Perez et al. (39)].

Several preventive treatments have been proposed: low-molecular-weight heparin (LMWH) and conventional low-dose heparin reduce the risk of thrombosis 60%, but conventional heparin therapy is associated with a greater risk of bleeding [Collins et al. (40)]. Aspirin is less effective with a similar risk of bleeding [Collins et al. (41)]. Oral anticoagulants are less effective than LMWH with an increased risk of bleeding when the INR exceeds 1.5 the control [Gerhart et al. (42)]. Compared with classical LMWH, selective factor Xa inhibitors such as fondaparinux (Arixtra™) reduce the risk of thrombosis by 55% but with greater risk of bleeding [Turpie et al. (43)]. There is no consensus at the present time concerning their use. Fisher et al. (44) recalled the usefulness of elastic compression which should not be overlooked. The contribution of new factor II inhibitors (ximelagatran), which can be taken orally, remains to be evaluated in this indication.

Prevention should start at admission because thrombotic events can occur very early, and are even present in some patients at admission [Zahn et al. (45), Hefley et al. (46)]. Because venous flow remains low for up to six weeks after surgery, both in the injured and healthy limb, with an increased risk of thrombosis [Wilson et al. (48), Dahl et al. (49)], preventive measures should be continued after discharge [Kenzora et al. (10), Grion et al. (47)].

LMWH is thus the method of choice. LMWH should be administered at admission and associated with elastic compression. The duration of treatment remains to be defined, even though in 1998 the American College of Chest Physicians (50) recommended continuing LMWH for up to ten days after the operation. Oral anticoagulation can be an alternative to LMWH if the INR can be maintained 2.5 times the control. Another solution would be low-dose classical heparin [Morrison et al. (13)]. Aspirin cannot be recommended.

Is nutritional support useful?

Patients with a hip fracture often present a state of undernutrition: 25% using clinical criteria (body mass index (BMI) < 20 kg/m²) [Bachrach-Lindstrom et al. (51)] and 18% to 57% using biological criteria (serum albumin or lymphocyte count) [Koval et al. (52)]. Poor nutritional status is a factor of poor prognosis; it is associated with longer hospital stay, higher hospital mortality and higher 1-year mortality [Koval et al. (52)].

It is very difficult to assess the nutritional status of elderly subjects. In one study comparing results obtained with different evaluation methods, the prevalence of undernutrition varied from 6.5% to 85% of patients, depending on the method used [Joosten et al. (53)]. The most widely used tests, preferred because of their simplicity, include serum albumin assay, or anthropometric methods such as the BMI. Interpretation of test results is nevertheless very difficult. The cutoff level for serum albumin is a subject of much debate: the level can be increased by dehydration and is related to both the hip fracture and the operation. In their study, Bachrach-Lindstrom et al. (51) found nearly normal serum albumin levels in hip fracture patients with poor nutritional status determined by anthropometric criteria associated with IGF-1 assay. It is also difficult to interpret BMI. Height decreases with age in elderly subjects, artificially increasing the BMI [Dey et al. (54)]. The threshold level retained for the diagnosis of poor nutritional status in patients undergoing surgery for hip fracture should take into account this age-related shorter height. It is also important to be aware of the BMI distribution curve in the reference population. The bias related to shorter height in the elderly can be avoided by estimating body height from measures of the heal-knee distance [Chumlea et al. (55)]. In light of these different evaluation difficulties, it would appear that the two methods for evaluating nutritional status should be associated in order to increase sensitivity.

Beyond these methodological difficulties, the feasibility and usefulness of correcting for poor nutritional status has led to some controversy. There are few randomized studies. Oral protein-energy supplementation does not improve the functional outcome [Espaulella et al. (56)]. Inversely, several studies have provided coherent evidence that nutritional supplements shorten the duration of the hospital stay [Takch et al. (57), Delmi et al. (58), Lauque et al. (59), Schurch et al. (60)] and reduce the risk of postoperative complications [Lawson et al. (61)] while having very few secondary effects. In these different studies, oral supplementation was administered for a prolonged period (1-6 months). Enteral nutrition using tube feeding is useful for patients with severe malnutrition: if well tolerated, it is associated with more rapid functional recovery and shorter hospital stay [Bastow et al. (62), Hartgrink et al. (63)]. However, it can be difficult to position of the feeding
tube in the duodenum during the postoperative period due to the presence of digestive motricity disorders [Sullivan et al. (64)]. In elderly subjects who often present disorientation and confusion, there is a risk of inhalation so that it is sometimes preferable to carefully position the tube in the duodenum rather than the stomach and thus reduce the risk of reflux and inhalation pneumonia with its serious consequences [Kortbeek et al. (65), Montecalvo et al. (66)].

Based on their analysis of these studies, the American College of Physicians (ACP) Journal Club concluded in 1998 that oral protein supplementation should be proposed for all patients undergoing surgery for hip fracture and that enteral nutrition using a nasogastric tube should be proposed for all patients with severe malnutrition [Avenell and Handoll et al. (67)].

Analyzing the published studies, it can also be noted that oral supplementation should be prolonged for at least one month and that enteral nutrition should be administered preferably at night in order to avoid limiting patient mobility during the day and to preserve appetite [Sullivan et al. (64)]. The feeding tube should be positioned in the duodenum rather than the stomach. For patients whose operation has to be delayed, it would be useful to start nutritional support via an oral or parenteral route before the operation.

Can the frequency of confusional episodes be reduced?

Episodes of confusion in patients admitted for hip fracture are frequent in the perioperative period: depending on the study and the criteria used, frequency can vary from 9 to 60% [Gustafson et al. (68), Rummans et al. (69), Brauer et al. (70)]. These episodes are associated with poor prognosis: longer hospital stay, higher rate of complications, fatal outcome, and institutionalization [Cole and Primeau (71), Francis (72), Levkoff et al. (73), Murray et al. (74)]. Functional outcome is also less satisfactory at six months [Marcantonio et al. (75)]. Several favoring factors are recognized. Some are unavoidable: male gender, dementia or history of confusional delirium before hip fracture [Edlund et al. (76)] while others are amendable by preventive measures: dehydration, drugs (benzodiazepine, opiates, anticholinergic agents), postoperative hypotension [Edlund et al. (76)], intercurrent infections, changes in the environment related to the hospitalization and aggravated by sensorial disorders (vision, hearing), pain [Brauer et al. (70), Francis (72), Purdie et al. (77), Moses and Kaden (78), Francis et al. (79)], contention [Beliveau and Mutch (80), Inouye (81)], loss of sleep [Inouye et al. (82)].

The rate of confusion or delirium is frequently underestimated because the disorders are not recognized or attributed inappropriately to dementia [Rumans et al. (69)]. They may also be missed if they are expressed by hypo-activity [Marcantonio et al. (83)]. Failure to institute preventive measures can be related to this underestimation despite the fact that several studies have demonstrated that confusion can be identified with validated tools (with validated versions in French) easily implemented by the health care team [Inouye et al. (84)] and the fact that the number of confusional episodes decreases by about 40% when appropriate measures are taken [Inouye et al. (82), Gustafson et al. (85)]. In their study, Gustafson et al. (85) found that prevention of confusional episodes shortens the hospital stay.

Based on these studies, the prevention of confusion should be proposed as part of the multifactorial management scheme, implicating regular evaluation of the patient’s status, if possible by a geriatrician, and systematic correction of favoring factors: hypoxia, hypotension, dehydration, immobility and/or contention, sensorial disorders, pain, sleep disorders. It also appears to be important to initiate these measures early before surgery. A specific organization of these preventive measures is required.

Should the bladder catheter be maintained after the operation?

A bladder catheter is often inserted in hip fracture patients before surgery, particularly when the operation is delayed or preoperative immobilization is necessary. Postoperatively, patients have a risk of incontinence, observed in 21% of patients during their hospital stay for hip fracture [Palmer et al. (86)], or inversely urine retention (50% of patients) and the subsequent risk of urinary tract infection [Smith and Albazzaz (87)]. There is no sound evidence that the indwelling bladder catheter favors the development of infection in the specific population of hip fracture patients. There are few studies in this population and the study methods have been less than satisfactory. There is only one study with 26 non-randomized patients suggesting that the risk of urinary tract infection is higher among those with an indwelling catheter [Johansson et al. (88)]. A more recent study by Hedstrom et al. (89) used multifactorial analysis of risk factors of urinary tract infection in 435 patients undergoing surgery for hip fracture did not find that the indwelling catheter had any influence. This negative result might be explained by a basal risk of urinary infection which is very high in this population. In their study, Johanson et al. (88) found that 38% of patients had urinary tract infections at admission and that 35% of the others developed an infection during their stay in the orthopedics ward.

Urinary retention is also a very frequent problem in this population. Smith and Albazzaz (87) reported that 37% of patients had a postmictional residue preoperatively and 56% postoperatively. Three randomized studies compared the effect of intermittent catheterism versus indwelling catheter during the early postoperative period in orthopedic surgery on the risk of urinary retention [Carpiniello et al. (90), Skelly et al. (91), Michelson et al. (92)]. The results are contradictory and do not allow a conclusion.

In 1998, Morrison et al. (13) recommended to remove the catheter 24 hours after surgery and advised intermittent catheterism, although there are few objective arguments from published studies to support this attitude. The studies on urine retention are contradictory and those on urinary tract infection do not show any greater risk with an indwell-
Should anemia be corrected systematically?

Anemia is observed in 45% of patients admitted with hip fracture [Gruson et al. (93)], versus 9% among other patients in the same age range [Salive et al. (94)]. Blood loss can aggravate pre-existing anemia in hip fracture patients. Anemia is associated with a 2-fold greater risk of hospital death and longer hospital stay but does not appear to influence the mid-term functional outcome [Gruson et al. (93)]. Transfusion practices vary with the institution. According to a North American study, the proportion of transfused patients varies from 31% to 54%, independently of the patients’ clinical characteristics [Poses et al. (96)]. Carson et al. (97) transfused when hemoglobinemia was less than 10 g/dL, basing their approach on a study showing that postoperative mortality is higher in these patients. A randomized study compared the impact of two transfusion strategies in anemic patients during the postoperative period after hip fracture surgery. The “aggressive” strategy used transfusion to maintain hemoglobinemia above 10 g/100 ml while the other strategy used transfusion if anemia was poorly tolerated, or when hemoglobinemia was less than 8 g/100 ml. There was no difference between the two groups at 60 days regarding mortality, ability to walk alone, or frequency of discharge to home [Carson et al. (98)]. The impact of anemia on the patient’s ability to participate in rehabilitation, particularly early after surgery, has not been studied extensively.

The usefulness of systematic transfusion, based on biological criteria, thus remains to be demonstrated, both in terms of mortality and functional outcome. Obviously, patients with symptomatic anemia, for example functional angina or malaise, require transfusion.

Is multidisciplinary management useful?

Taking into account the multiplicity of the medical problems to be managed in the postoperative period in these elderly patients, several authors have conducted randomized studies to examine the impact of multidisciplinary management practices (including a geriatrician) during the stay in surgery. These studies have demonstrated a favorable effect of multidisciplinary care in terms of risk of confusion during the hospital stay and the duration of the stay in orthopedic surgery [Gustafson et al. (99), Marcantonio et al. (100)], as well as on the proportion of discharges to home and the long-term functional outcome [Kennie et al. (101), Applegate et al. (102)]. Most of these studies are old and used historical control groups or did not consider partial management practices, for example solely for patients presenting episodes of confusion [Marcantonio et al. (100)]. Inversely, a recent study on multidisciplinary care associating a geriatrician, a physical therapist, a work-therapist, a social assistant, and a specialized nurse showed that discharge to former residence and recovery of prior level of independence where unaffected. In their review of trials on this topic, Cameron et al. (104) concluded that the efficacy of multidisciplinary management is not demonstrated.

These findings are not coherent with results of studies on the prevention of confusional episodes (see above), which generally included evaluation by a geriatrician and which demonstrated its efficacy at least on limiting the duration of the hospital stay. Despite clearly demonstrated scientific evidence, in the context of English-speaking hospitals, there is a group of arguments suggesting that the intervention of a geriatrician during the stay in the orthopedic ward helps limit the risk of complications and improves patient care.

However, it has been demonstrated that the efficacy of geriatric intervention protocols is related to the compliance of the nursing team to the geriatrician’s recommendations [Inouye et al. (105)]. A good level of compliance is difficult to obtain from an orthopedic nursing team where the main objectives are purely surgical. The lack of specific training in geriatrics is also an important factor.

What is the optimal modality for rehabilitation?

During the early postoperative period, the objective of the first attempt to rise from bed or sit in a chair (within 24 hr of operation) is to limit cost by shortening the hospital stay. A recent randomized study demonstrated that early rising does not affect the functional outcome [Cameron et al. (106)], and there is no randomized study demonstrating that early rising improves functional outcome. Nevertheless, the comparative non-randomized study reported by Koval et al. (107) demonstrated that after adjustment for associated comorbidity and preoperative independence, early rising is associated with both improved functional outcome and reduced number of thromboembolic events.

Once the patient has achieved the phase of sitting in a chair, the question is the optimal number of rehabilitation exercises, which in practice is dependent on the number of physical therapists available. The randomized studies by Karumo (108) and Jette et al. (109) failed to demonstrate any beneficial effect of more than one physical therapy session per day. There has been no randomized study demonstrating a benefit for less than one session per day. Conversely, several non-randomized cohort studies, including a recent multifactorial analysis, suggest that patients who have at least five physical therapy sessions per week (one per weekday) have a better functional prognosis both in the short term (early walking) and long term (level of independence), at least for those living alone at home before their hip fracture [Guccione et al. (110), Magaziner et al. (111), Hoenig et al. (112)].

Taking into account these elements, the current recommendations favor early rising, within 24-48 hours of surgery, with physical therapy sessions scheduled once a day five days a week.
Convalescence: rehabilitation or geriatric ward?

The convalescence of elderly patients who underwent surgery for hip fracture can be conducted in a rehabilitation unit or a unit with a geriatric orientation. The results of different studies have varied. In the United States, admission in a rehabilitation unit does not improve the functional prognosis except for patients with a rather good general health status. The prognosis of the more seriously ill is not better after convalescence in a specialized unit versus a conventional postoperative follow-up unit [Kane et al. (113)]. This negative result could be explained by the incapacity of the more seriously ill to benefit from rehabilitation. Huusko et al. (114) demonstrated that among valid but moderately demented patients before their hip fracture, 63% whose convalescence was conducted in a specialized geriatric unit were living independently one year after their fracture versus 33% of those whose convalescence was conducted in a classical follow-up unit. However, geriatric care included two physical therapy sessions daily, the frequency of these sessions not being mentioned for the control group. In an older study, Galvard and Samuelsson (115) found that specific geriatric care did not improve outcome. Here the control patients were older and the mental status of the patients was not assessed. It is thus difficult to determine the optimal modality for convalescence after hip fracture, particularly because of the diversity of the surgical procedures performed and the confounding factors taken into account in the published studies. Geriatric management for elderly often frail patients with multiple co-morbid conditions and often early-stage dementia, and rehabilitation management for elderly subjects in good general status might be an appropriate trend to recommend.

What about prevention of recurrence?

Prevention of recurrent hip fracture relies on two components: treatment of frail bone and prevention of falls.

Up to 80% of patients who undergo surgery for hip fractures will fall again during the year following their first fall [Shaw et al. (116)] and 2 to 7% will have another hip fracture [Chiu et al. (117), Wolinsky and Fitzgerald et al. (118)]. The efficacy of fall prevention measures in patients who have had a hip fracture is highly controversial. International guidelines [American Geriatrics Society (119), Tinetti (120)] propose early evaluation of the risk of falls, preferably by a geriatrician who should search for balance disorders, possibly favored by inappropriate medications, and visual, joint, cardiac or neurological disorders. Postural physical therapy should be undertaken, associated if possible with training exercises performed at home, use of crutches, discontinuation of medications favoring falls, adaptation of the environment and treatment of any orthostatic hypotension or cardiac arrhythmia. The efficacy of these interventions is demonstrated in non-demented subjects, but remains a matter of debate among elderly demented subjects. In their randomized study of 274 demented patients aged 65 years or more, Shaw et al. (116) were unable to find any difference in the risk of recurrent falls with or without institution of preventive measures.

The other component of the prevention of recurrent hip fracture is to reduce the risk of fracture in the event of a new fall by improving bone strength. According to the international guidelines [Heinemann (121)], all patients who have had a hip fracture after low-energy trauma should be considered to have osteoporosis. Several treatments have been shown to be effective for the prevention of fractures in patients with osteoporosis. Chapuy et al. (122) demonstrated that the combination of high-dose calcium 1200 mg/d and vitamin D (800 IU/d) for three years reduces the risk of hip fracture by 30% in elderly women (mean age 84 years). The dose administered must be sufficient because Lips et al. (123) found that if the calcium and vitamin D doses are too low (calcium 800 mg/d and vitamin D 400 IU/d) there is no effect on osteoporosis.

Noting this reservation, calcium-vitamin supplementation can thus be proposed for all patients admitted for hip fracture [George and Patel (124)] by analogy with the recommendations concerning osteoporotic subjects without fractures, although the efficacy of this preventive measure against secondary fracture remains to be demonstrated. Vitamin D deficiency is frequent in women admitted for hip fracture [Leboff et al. (125)]. Gardner et al. (126) suggested that hip fracture is a sign of particularly severe osteoporosis. This population should thus receive, according to these authors, a complementary treatment for bone resorption (estrogen, calcitonin, bisphosphonates or raloxifen) in addition to their “minimal” treatment. Hormone replacement therapy raises the problem of the duration of the prescription due to the associated risk of endometrial cancer and cardiovascular events. The long-term effects of calcitonin and raloxifen are under evaluation. Raloxifen has demonstrated efficacy for the prevention of vertebral body compression fractures but not for the prevention of hip fractures [Ettinger et al. (127)]. Conversely, bisphosphonates, particularly risedronate, could be effective for the treatment of osteoporosis in patients with hip fracture. Several studies have shown that risedronate reduces the risk of hip fracture 30 to 40% in women with a history of vertebral compression [Harris et al. (128), Register et al. (129), McClung et al. (130)]. Its efficacy appears to be more marked in women aged less than 80 years.

Alendronate is also considered to be effective for primary prevention of hip fractures according to the meta-analysis reported by [Karpf et al. (131)]. Bisphosphonates are well tolerated. The main secondary effect could be the development of moderate esophagitis which regresses at withdrawal. These treatments could thus be proposed widely, in addition to calcium-vitamin supplementation, in hip fracture patients. The need for a densitometric evaluation of osteoporosis is debated: it is recommended by the AFSSAPS but George and Patel (124) do not consider it to be indispensable.
The role of mechanical hip protective devices for preventive purposes has been debated for many years due to the presumed poor patient acceptance. However, in a recent randomized study reported by Kannus et al. (132) which included 1800 institutionalized patients (mean age 82 years), the risk of hip fracture was reduced by 60% among patients who accepted to wear the protective device (30% of patients declined). The safety and low cost of this preventive measure could make it a good proposal for all patients with hip fracture.

CONCLUSION

The functional outcome and mortality of patients with hip fracture depends on several complications which require complex preventive and management practices. Practices of the different health care disciplines involved should be adapted to each individual patient. Furthermore, continued interest in this issue of complications should be pursued throughout the management pathway through the different institutional structures.

A critical analysis of data published to date reveals that explicit guidelines based more or less on rational evidence have been developed for professional practices of the diverse disciplines involved in the care of patients with hip fractures.

However, there appear to be several barriers hindering implementation of these recommended practices. Professional teams need to become fully aware of the issues involved and choose among the questions presented above those which require dynamic action in their particular environment. By confronting voluntarily their own results with those obtained with the different management schemes proposed would constitute a new perspective in the evaluation of health care for hip fracture patients.

A research project, INPEC(H), supported by the DRESS is currently under way to select, follow-up, and compare indicators of patient management among the hip fracture population. Conducted in three hospital centers in western France, the first results should be available in 2004.

References


65. KORTTBEEK JB, DAUGHLFhl, DEOG C: Duodenal versus gastric feeding in ventilated blunt trauma patients: a randomized controlled trial. J Trauma, 1999, 46, 992-998.


