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Medical consultation for patients with hip fracture

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INTRODUCTION — Approximately 250,000 hip fractures occur annually in the United States; this number is projected to increase substantially in the coming decades [1]. Mortality from hip fracture approaches 25 percent at one year [2]. Of those who survive to six months, only 60 percent recover their prefracture walking ability, and 50 percent recover their prefracture ability to perform activities of daily living [3].

Hip fracture is typically considered a surgical disease. However, medical consultants are almost universally involved in the care of these patients [4]. The most common decisions that medical consultants are asked to make in the care of the patient with hip fracture are reviewed here. In particular, we will focus on:

- The timing of surgical intervention
- Prophylactic antibiotics
- Thromboembolic prophylaxis
- The prevention and management of delirium

TIMING OF SURGICAL INTERVENTION — The timing of surgical intervention in patients with hip fracture, although ultimately set by the surgeon, is often dictated by the preoperative medical evaluation. The timing of surgery may have an important impact upon patient outcomes [5]:

- Delay in surgical repair will result in a postponement of full weight bearing status, leading to delayed functional recovery.
- Prolonged bed rest may increase the risk of medical complications such as deep venous thrombosis, pulmonary complications, urinary tract infection, and skin breakdown.
- Conversely, failure to stabilize coexisting medical conditions prior to surgery may increase the risk of postoperative complications.

A number of studies have examined the effect of operative timing on postsurgical outcome [6-20]. Interpretation of these data are complicated by the fact that many of the studies were small and underpowered, and most did not control for the presence and severity of comorbidities, or they excluded patients with complicating medical conditions. Furthermore, even the studies that attempted to control for comorbidities had mixed results [8,14-20].

While most studies suggest that surgical repair within 24 to 48 hours reduces mortality [14-17,20], the largest study that controlled for comorbid conditions suggests that time to surgery is more a marker of comorbidity. In this report, 8383 patients ages 60 years and older who underwent surgical repair for a hip fracture were retrospectively studied [18]. Surgery was delayed for more than 24 hours in 2464 patients (29 percent) for medical reasons and in 1341 (16 percent) without active medical problems. In the unadjusted analysis, a longer time to surgery was associated with greater long-term mortality. However, after adjusting for demographic characteristics and underlying medical problems, patients who had surgery more than 96 hours after admission did not have increased mortality compared with patients who had surgery 24 to 48 hours after admission (hazard ratio 1.07, 95% CI 0.95-1.21). Similar to another report [8], the risk of decubitus ulcer was increased in the group who had delayed surgery (odds ratio 2.2, 95% CI 1.6-3.1).

Observational studies that looked at even earlier times to surgery (within 24 hours), adjusting for comorbidities, found that patients who underwent early surgery had reduced pain, decreased length of stay [19] and decreased in-hospital mortality [20]. Case series suggest that surgical repair of hip fracture within the first 24 to 48 hours of admission is associated with a decrease in one-year mortality for patients who are medically stable without active comorbid illness (eg, unstable angina) [4].

It is unlikely that delaying surgery for an extensive medical or cardiac evaluation is of value, although there are little data available on this topic to guide the clinician [21]. The question of whether to operate immediately (eg, in the middle of the night) or to wait until a more convenient time is also unanswered but will probably be determined more by local hospital conditions than by the medical consultant [21].

Preoperative morbidity — Hip fractures commonly occur in frail older people who have underlying comorbidity. In this context, with unanticipated need for urgent surgery, questions have been raised about the risks of proceeding to surgery with uncorrected underlying abnormalities versus the risks of delaying surgery to maximize preoperative status [21]. A prospective cohort study has identified a set of major clinical criteria for medical findings that would impact surgical outcome if uncorrected prior to surgery; validation of these criteria awaits further study [22].

Recommendations — While the question of the optimal timing of surgery in patients with hip fracture is not settled, it seems reasonable to recommend early surgery (within 24 to 48 hours) in patients who are medically stable and do not have significant comorbid illness. On the other hand, there does not seem to be substantial harm in waiting as long as 72 hours in patients with active comorbid medical illness such as congestive heart failure, active infection (eg, pneumonia), unstable angina, or severe chronic obstructive pulmonary disease; these individuals probably would benefit from a more extensive preoperative evaluation and medical management of these conditions prior to repair of their fracture. (See "[Estimation of cardiac risk prior to noncardiac surgery](#)" and [see "Evaluation of preoperative pulmonary risk"](#) and [see "Perioperative heart failure in noncardiac surgery"](#)). Unless contraindicated, thromboembolic prophylaxis should not be postponed in patients who are awaiting surgery ([see "Thromboembolic prophylaxis" below](#)).

There are few data on patients who have had surgery more than 72 hours after hospital admission, but this practice should be avoided if possible since it is likely to increase at least patient morbidity. Aggressive decubitus ulcer prevention measures should be employed in patients in whom surgery is delayed beyond 24 to 48 hours. ([See "Prevention and treatment of pressure ulcers"](#)).

PROPHYLACTIC ANTIBIOTICS — Prophylactic antibiotics are commonly administered to prevent wound

infection following orthopedic procedures. A number of studies have addressed the use of antibiotic prophylaxis prior to repair of hip fracture, focusing upon four main areas:

- The efficacy of antibiotic therapy
- The timing of administration
- The duration of use
- The choice of agents

Efficacy of antibiotic prophylaxis — A systematic review of 22 controlled trials of administration of prophylactic antibiotics in 8307 patients undergoing surgical management of hip and other long bone fractures found that antibiotic prophylaxis reduced the risk of deep wound infections by 60 percent and also reduced the risk of superficial wound infections, urinary tract infections, and respiratory tract infections [23].

An earlier meta-analysis of seven studies of antibiotics administered to patients with hip fracture found similar reductions in the risk of postoperative infection [24]. The most common organism isolated from the placebo groups in these studies was staphylococcus aureus [25-31].

Agents studied for hip fracture prophylaxis have included antistaphylococcal penicillins and first, second, and third generation cephalosporins [23,24].

Timing of administration — The timing of administration of antibiotic prophylaxis has not been well studied. The only trial available to date was a cohort study of 2847 elective surgical procedures [32]. Patients who were given their first dose of antibiotics less than two hours before surgery had the lowest incidence of postoperative infections compared with administration within three hours following surgery (relative risk of infection 2.4, 95% CI 0.9-7.9); 3 to 24 hours following surgery (relative risk 5.8, 95% CI 2.6-12.3); or 2 to 24 hours before surgery (relative risk 6.7, 95% CI 2.9-14.7).

Thus, prophylactic antibiotics should be initiated within two hours prior to surgery.

Duration of therapy — The optimal number of antibiotic doses was studied in two meta-analyses [24]:

- One review examined four studies that compared multiple doses of antibiotics (range 2 to 10) to a single dose given immediately prior to surgery. There was a trend towards a lower rate of postoperative wound infection rates in the multiple dose group (odds ratio 0.6, 95% CI of 0.18-2.02), although the difference was not statistically significant.
- A second analysis compared the administration of three doses of antibiotics (cefuroxime [33] and cefamandole [34]) to multiple doses (cefuroxime for three doses followed by cephalexin for six days [33], and five doses of cefamandole [34]). There were no significant differences in the observed rates of postoperative wound infections.

Given these results, therapy should probably be continued for 24 hours (eg, three doses of antibiotics).

Choice of agent — As previously mentioned, the major pathogen in wound infections is Staphylococcus aureus [24]. Thus, we recommend using a first generation cephalosporin (eg, cefazolin 1 to 2 g intravenously Q 8 hours) [35]. Vancomycin (1 g intravenously Q 12 hours) should be used in patients allergic to penicillins and cephalosporins and for those admitted to hospitals in which methicillin-resistant S. aureus and S. epidermidis are a frequent cause of postoperative wound infections. (See "Treatment of methicillin-resistant or vancomycin resistant Staphylococcus aureus infection in adults").

Recommendations — All patients should receive prophylactic antibiotics within 2 hours prior to surgery and antibiotics should be continued for 24 hours following surgery. Patients should receive either a first generation cephalosporin or vancomycin for those patients with known allergy to cephalosporins or penicillins.

THROMBOEMBOLIC PROPHYLAXIS — Venous thromboembolism is one of the leading causes of postoperative morbidity and mortality in patients with hip fracture. Fatal pulmonary embolism occurs in 4 to 7 percent of patients undergoing surgery for a fractured hip. ([See "Prevention of venous thromboembolic disease"](#)). Factors increasing the risk of venous thrombosis include advanced age, malignancy, previous venous thromboembolism, obesity, heart failure, paralysis, or the presence of an inhibitor deficiency state ([show table 1](#)). The most common inhibitor deficiency state is activated protein C resistance, a defect usually caused by a mutation in the gene coding for coagulation factor V and known as factor V Leiden. This mutation is found in 3 to 7 percent of the white population [[36](#)]. ([See "Activated protein C resistance and factor V Leiden"](#)).

The high risk associated with orthopedic surgery results from a number of factors that contribute to venous stasis, including the supine position on the operating table and the anatomic positioning of the extremity. Intimal injury can occur as a consequence of the original trauma or surgical intervention, and transient hypercoagulability may result from the release of tissue factors, further increasing the risk of thrombosis.

Thromboembolic prophylaxis is becoming a routine aspect of the care of the patient with hip fracture. However, a number of questions remain, including the choice of the optimal agent and the timing and duration of prophylaxis.

Heparin — Low-dose unfractionated [heparin](#) (5000 units subcutaneously twice daily) has been the agent most frequently studied for thromboembolic prophylaxis. A meta-analysis of eight studies involving 623 patients undergoing general, orthopedic, or urologic surgery found that low-dose unfractionated heparin reduced the risk of deep venous thrombosis by 64 percent compared with placebo [[37](#)]. Only two studies have looked at the use of low-dose unfractionated heparin specifically in patients with hip fracture; both found a substantial reduction in risk of venous thromboembolism, although the studies were small and had large confidence intervals [[38,39](#)].

Low molecular weight [heparin](#) confers a similar reduction as low-dose unfractionated heparin in the risk of thromboembolic disease [[40-42](#)]. ([See "Low molecular weight heparin for venous thromboembolic disease"](#)). A number of low molecular weight heparin fractions are available. These drugs can be given once or twice a day at a constant dose without laboratory monitoring and are associated with a lower incidence of thrombocytopenia than unfractionated heparin. As an example, one randomized, double-blind study of patients after hip surgery found that thrombocytopenia occurred in 9 of 332 patients (2.7 percent) receiving unfractionated heparin compared with none of 333 receiving low molecular weight heparin [[43](#)]. ([See "Clinical use of heparin and low molecular weight heparin"](#)).

Anticoagulation with low-dose unfractionated [heparin](#) slightly increases the risk of postoperative bleeding from a baseline rate of 2.9 percent in patients treated with placebo to 3.5 percent in patients treated with heparin [[37](#)]. Studies involving low molecular weight heparin have reported a similar low incidence of postoperative bleeding, although one report suggested that it may cause bleeding or hematomas within the spinal column when used concurrently with spinal or epidural anesthesia [[44](#)]. The current recommendations from the Food and Drug Administration (FDA) are that patients receiving epidural/spinal anesthesia who are treated with low molecular weight heparin should be monitored frequently for signs and symptoms of neurologic impairment [[44](#)].

Antiplatelet agents — A meta-analysis of 10 orthopedic trauma trials found that [aspirin](#) significantly reduced the rate of deep venous thrombosis and pulmonary embolism as compared with placebo (odds ratio 0.69 for deep venous thrombosis and 0.40 for pulmonary embolus) [[45](#)]. However, this reduction was significantly less than for other agents.

- In one double-blind, randomized controlled trial of 251 hip fracture patients, administration of low molecular weight [heparin](#) resulted in a relative risk reduction of 37 percent (95% CI 3.7 percent to 59.7 percent) as compared with aspirin [[46](#)].

- In a second report, 194 patients were randomly assigned to receive aspirin, [warfarin](#) or placebo following hip fracture [47]. The incidence of all thromboembolic events in the warfarin group was approximately one-half that observed in the placebo or aspirin groups (20 percent [warfarin] versus 40.9 percent [aspirin] and 46 percent [placebo] [$p < 0.01$]).

- A third study found no significant difference between [dextran](#) and aspirin prophylaxis [48]. However, these results are suspect given the low incidence of thromboembolic events observed in the trial.

Thus, [aspirin](#) provides some protection against thromboembolic events after hip-fracture, although the degree of protection is less than with other agents (heparins, [warfarin](#), and likely [dextran](#)). Aspirin should be used only in patients at high risk for hemorrhagic complications with other drugs. Most studies have employed between 325 mg and 650 mg of aspirin per day.

Warfarin — Low-dose [warfarin](#) (1.5 times control) has been studied in two placebo-controlled trials of patients with hip fracture [47,49]; it has also been compared to low molecular weight [heparin](#) [50] and, at a target INR of 2 to 2.7, to [aspirin](#) [47]. Warfarin significantly reduces the risk of thromboembolic disease as compared with placebo and aspirin; the magnitude of risk reduction appears to approach that of low-dose unfractionated heparin (based upon studies that have compared heparin with aspirin or placebo).

[Warfarin](#) has not been compared directly with low-dose unfractionated [heparin](#), but it has been compared with low molecular weight heparin [50]. In this study, warfarin was less effective than low molecular weight heparin (incidence of deep venous thromboembolism 21 versus 7 percent) [50]. It should be noted, however, that patients receiving warfarin only had a targeted INR of 1.5, and the endpoint also included asymptomatic DVT. Comparison studies using higher targeted INRs are not available.

Thus, low-dose [warfarin](#) is an effective agent for thromboembolic prophylaxis. It is more effective than [aspirin](#) but may be less effective than low molecular weight [heparin](#). The INR monitoring required for appropriate treatment with warfarin is a potential drawback. Conversely, it might be a better tolerated agent for patients wishing to avoid the discomfort of a twice daily injection.

Based upon the studies reviewed, we recommend a target INR of 2.0. The American College of Chest Physicians recommends a target INR of 2.5. Although it is difficult to specify precise dosing, we typically administer [warfarin](#) 5.0 mg/day for three days beginning on postoperative day one, using the INR to guide further dosing.

Fondaparinux — [Fondaparinux](#) is a synthetic highly sulfated pentasaccharide that binds to [antithrombin](#) (AT) with a higher affinity than the native pentasaccharide of unfractionated [heparin](#) or low molecular weight heparin, and causes a conformational change in AT that significantly increases the ability of AT to inactivate factor Xa. (See "[Clinical use of fondaparinux](#)", section on Hip fracture surgery).

In a phase III trial, patients undergoing surgery for fracture of the upper third of the femur were randomly assigned to treatment with [fondaparinux](#) (2.5 mg once daily starting 4 to 8 hours postoperatively) or [enoxaparin](#) (40 mg/day starting 12 hours preoperatively) [51]. The incidence of venous thromboembolism by day 11 was significantly lower with fondaparinux (8.3 versus 19.1 percent). There were no significant differences in the incidence of death or major bleeding.

[Fondaparinux](#) is approved by the US FDA for prevention of venous thromboembolic disease in patients with hip fracture. Given its cost and given greater experience with other agents, we do not currently recommend fondaparinux as a first-line agent for prophylaxis.

Intermittent leg compression — Pneumatic sequential leg compression devices appear to decrease the incidence of postoperative deep vein thrombosis in urological, neurosurgical, and general surgical patients [52]. A systematic review of five trials with 487 patients warned that the trials were methodologically flawed but found lower pooled rates of DVT in patients treated with mechanical

pumping devices (7 versus 22 percent) [42].

Based upon these data, we recommend the routine use of intermittent pneumatic compression devices in addition to anticoagulation until the patient is ambulating on a routine basis. These devices should be used with caution in the elderly delirious patient who may perceive them as a form of restraint, and in whom they may increase the risk for falls.

Timing and duration of anticoagulation — The appropriate timing and duration of anticoagulation is unclear. Most studies have examined the efficacy of prophylactic anticoagulation upon admission to the hospital. Until more definitive data are available, it seems reasonable to recommend the initiation of anticoagulation as soon as possible following fracture given the apparent low risk of bleeding complications associated with the use of the agents described above and the increased risk of thromboembolism following fracture and bed rest [4].

There are no data in patients with hip fracture that address how long anticoagulant therapy should be continued. Two autopsy series suggest that prophylaxis should be continued following hospitalization [53,54]. In one study of a group of patients with hip fracture that did not receive any form of prophylaxis, the rate of fatal pulmonary embolism declined from 1 percent at 30 days, to 0.4 percent at 60 days and 0.2 percent at 90 days [53]. Conversely, in a second autopsy series of patients who received prophylactic antithrombotic agents, the majority of fatal pulmonary emboli were observed 30 days or more following fracture repair [54]. The results of these two studies suggest that prolonged prophylaxis might be helpful in some patients, although which patients and for how long needs to be empirically studied. At present, it seems reasonable to continue prophylaxis until the patient is fully ambulatory and to extend prophylaxis further in patients in whom the risk of deep venous thrombosis may be increased (eg, those who experienced prolonged immobility post-repair or patients in whom surgery was delayed).

Recommendations

- All patients should receive either low-dose unfractionated [heparin](#) (5000 units twice a day) or low molecular weight heparin upon admission to the hospital unless contraindicated.
- Patients who cannot take heparin should be started on [warfarin](#) (5 mg per day) on admission with a target INR of 2 to 3. If cost is not an issue, a reasonable alternative therapy in such patients is daily subcutaneous administration of [fondaparinux](#) 2.5 mg.
- Patients who cannot take heparin or warfarin should receive [aspirin](#) (325 mg to 650 mg per day).
- In addition to heparin, warfarin, or aspirin, patients should wear pneumatic compression stockings.
- Prophylaxis should be continued until patients are fully ambulatory.

DELIRIUM — Delirium is a transient global disorder of cognition that is characterized by concurrent difficulty with attention, perception, thinking, memory, psychomotor behavior, and the sleep wake cycle [55,56]. It may be the most frequent complication observed in the hospitalized elderly [57]. Delirium occurs in an estimated 11 to 30 percent of elderly general medical patients [58] and in as many as 61 percent of patients with hip fracture [59]. Despite its prevalence, delirium is often unrecognized or misdiagnosed, particularly in the elderly [58]. ([See "Diagnosis of delirium and confusional states"](#)).

Risk factors for the development of delirium include advanced age, history of cognitive impairment, greater illness severity, sensory impairment, vision impairment, dehydration and electrolyte imbalances, and hip fracture on hospital admission [60-65].

Common precipitating factors include physical restraints, urinary catheters, iatrogenic medical complications, more than three new medications ([show table 2](#)), and malnutrition [63]. In one study, over

half of the cases of delirium in patients with hip fracture occurred after surgery [66]. Most cases had multifactorial etiologies; the most common causes included sensory/environmental, infection, drug use, and fluid/electrolyte disturbance. One small, randomized trial found that the use of spinal anesthesia did not appear to reduce the risk of delirium below that seen with general anesthesia [67].

Pain has been shown to increase the risk of delirium in patients undergoing joint replacement surgery, elective noncardiac surgery, and after hip fracture; adequate analgesia can decrease this risk [68-70]. Although opioids can produce sedation and may also be associated with delirium [71], the beneficial effect of controlling perioperative pain appears to outweigh the risk of most opioids such that on balance their use perioperatively does not increase, and may decrease, the risk of delirium [69,70]. [Meperidine](#), however, appears to be associated with delirium even in the perioperative setting and should be avoided [70]. (See "[Prevention and treatment of delirium and confusional states](#)", section on Opioids).

Another etiology of delirium to consider is withdrawal in patients dependent on benzodiazepines or alcohol who no longer have access to those substances after hospitalization. Historical information from the patient or family and physical exam findings can suggest the diagnosis of withdrawal. (See "[Identification and management of alcohol use disorders in the perioperative period](#)" and see "[Sedative and stimulant abuse in adults](#)" and see "[Prevention and treatment of delirium and confusional states](#)").

Delirium in hospitalized patients increases the length of stay, risk of complications, mortality, and institutionalization [72-76]. Delirium may have further deleterious effects in patients with hip fracture by interfering with rehabilitation activities and delaying the return to weight bearing. The majority of patients who develop delirium have at least some persistent symptoms as long as six months later. Thus, the prevention and management of delirium is an important issue in the care of elderly hip fracture patients.

Prevention and management — There are four basic principles of delirium prevention and therapy (see "[Prevention and treatment of delirium and confusional states](#)", [show algorithm 1](#)):

- Avoidance of factors known to cause or aggravate delirium
- Identifying and treating the underlying acute illness
- Providing supportive and restorative care to prevent further physical and cognitive decline
- Controlling dangerous and disruptive behaviors so the first three steps can be accomplished.*

The management of delirium has largely been based upon clinical experience because few systematic and controlled studies have been performed [77]. Two nonrandomized studies have been conducted in patients with hip fracture. One group conducted a pre- and postoperative nursing intervention in 227 patients [78]. The interventions carried out by the regular nursing staff included "preventive measures" related to strange environment, altered sensory input, loss of control and independence, immobility, and disruption of elimination patterns; and "ameliorative approaches" related to mild confusion, sundowning, unsafe behaviors, hallucinations, and delusions. The incidence of delirium in the first five postoperative days was 44 and 52 percent in the treatment group and controls, respectively.

A second study compared 103 treatment subjects with hip fracture to 111 historical controls admitted two to five years prior to the intervention cohort [79]. The intervention in this study consisted of pre- and postoperative geriatric assessments, [oxygen therapy](#) for hypoxia, early surgery (performed as soon as patients were medically stable), and aggressive treatment of perioperative blood pressure falls. The incidence of delirium during the first seven postoperative days was 61 and 48 percent in the historical controls and the treatment group, respectively. Subjects in the treatment group were less likely to be confused for more than seven days and had a shorter length of stay.

Early geriatrics consultation may also be helpful. A prospective, randomized, blinded study of 126 patients over the age of 65 admitted emergently for surgical repair of hip fracture found that proactive geriatrics consultation reduced the risk of delirium compared with usual care (32 versus 50 percent of patients affected) [80]. One case of delirium was prevented for every 5.6 patients in the geriatrics

consultation group.

Three studies have examined nursing interventions in the medically ill elderly [81-83]. These reports, which relied largely upon nursing education with respect to reorientation and environmental manipulations, revealed no significant differences in the development of delirium, although one found that the intervention cohort had a shorter duration and decreased severity of delirium compared with controls [83]. A randomized, controlled trial to assess the impact of a geriatric assessment on the management of delirium in the medically ill elderly found no significant difference with regard to performance on mental status and behavioral scales or to the use of restraints, length of stay, discharge site, or mortality rate [84].

Pharmacologic management of the symptoms of delirium in general has not been well studied. One randomized control trial did evaluate the use of low dose [haloperidol](#) (1.5 mg/day) in 430 hip surgery patients aged 70 years or older who were at risk for delirium based on visual impairment, cognitive impairment, dehydration, and illness severity [85]. Haloperidol was started preoperatively and continued for up to three days postoperatively. The incidence of postoperative delirium was not reduced in the treatment group, although haloperidol-treated patients had a decrease in duration of delirium and hospitalization.

Low-dose neuroleptics (eg, [haloperidol](#)) and occasionally benzodiazepines may be necessary in some cases for prompt symptom control to prevent harm or allow evaluation and treatment. However, benzodiazepines may increase confusion, and neuroleptics have an increased risk of producing extrapyramidal side effects in elderly patients and the atypical antipsychotics [risperidone](#) and [olanzapine](#) may be preferable. (See "[Prevention and treatment of delirium and confusional states](#)", section on Psychotropic medication).

Recommendations — We recommend minimizing or discontinuing sedative-hypnotic and anticholinergic medications for patients who develop delirium; however, patients who develop delirium may also need to be assessed for withdrawal from benzodiazepines or alcohol. (See "[Identification and management of alcohol use disorders in the perioperative period](#)" and see "[Sedative and stimulant abuse in adults](#)"). In addition, supportive reorientation and environmental manipulations should be employed. Patients should receive adequate pain control, and if opioid analgesics are needed, [meperidine](#) should be avoided.

Patients who do not respond to these simple measures may benefit from a low-dose major tranquilizer (eg, [haloperidol](#) 0.25 mg to 0.5 mg orally or intravenously every 6 hours, [risperidone](#) 0.25 mg to 0.5 mg orally twice a day, or [olanzapine](#) 2.5 mg orally once a day).

OSTEOPOROSIS — Hip fracture is a manifestation of severe osteoporosis. Thus, patients with a recent hip fracture should be evaluated and treated for their underlying osteoporosis. Unfortunately, the majority of patients who have had fragility fractures are not evaluated for osteoporosis and do not subsequently receive antiresorptive therapy, which has been shown to reduce the risk of a second fracture [86-88]. As an example, in a retrospective review of 124 women with fragility fractures, over 50 percent were not receiving any treatment for osteoporosis [86]. In a second community-based study of 60 women over age 65 with a recent hip fracture, only 13 percent were receiving adequate treatment for osteoporosis as defined by the National Osteoporosis Foundation [87]. Forty-seven percent of women were receiving partial, but inadequate treatment, while 40 percent were receiving no treatment at all. Thus, physicians and patients need to be educated on the importance of osteoporosis treatment after a hip fracture.

Similarly, the majority of patients with spine and distal radius fractures do not receive evaluation and treatment for underlying osteoporosis. (See "[Overview of the management of osteoporosis in postmenopausal women](#)" section on Medical intervention after fracture).

OTHER ISSUES — Other issues that arise in patients with hip fracture include nutritional management, prevention of pressure ulcers, urinary tract management, rehabilitation, and assessment of fall risk.

- Oral nutritional supplementation (eg, Ensure™ or Sustacal™, one can three times daily between meals) appears to be beneficial for reducing minor postoperative complications in patients with hip fracture, preserving body protein stores, and reducing the overall length of stay [89-92]. Nocturnal enteral feeding should be considered for patients with moderate to severe malnutrition [93]. (See ["Overview of parenteral and enteral nutrition"](#) and [see "Assessment of nutrition in the critically ill"](#)).
- Pressure sores occur in 10 to 40 percent of patients hospitalized for hip fracture, and increase nosocomial infection rates and lengths of stay [94]. Use of foam or alternating pressure mattresses, compared with usual care, reduce the incidence of pressure sores [94]. In one report, as an example, a six-inch deep foam mattress reduced the incidence of pressure ulcers among elderly patients with hip fractures from 68 to 24 percent [95]. (See ["Prevention and treatment of pressure ulcers"](#)).
- Short-term use of indwelling urinary catheters appears to reduce the incidence of urinary retention and bladder overdistention compared with intermittent catheterization alone, without increasing the rate of urinary tract infection [96]. However, the catheter should be removed within 24 hours of surgery; patients can be managed subsequently with intermittent catheterization [96,97]. (See ["Urinary tract infection associated with indwelling bladder catheters"](#)).
- Early mobilization of patients after hip fracture repair is safe, although the benefits of this approach have not been conclusively demonstrated [98-100]. Patients should receive at least two physical therapy sessions per day [3,100,101]. Intensive geriatric rehabilitation may be able to reduce length of stay [102].
- Exercise and balance training should be undertaken in ambulatory patients after hip fracture to reduce the risk of falls [103]. Interventions directed at specific risk factors may help prevent future falls. (See ["Overview of falls in the elderly"](#)).

SUMMARY — Important issues to consider in patients with hip fracture include the following:

- Attempt surgical repair, when possible, within 24 hours of hospital admission.
- Prophylactic antibiotics are ideally administered within two hours prior to surgery.
- Patients should receive either low-dose unfractionated [heparin](#) (5000 units twice a day) or low molecular weight heparin on admission and should wear pneumatic compression stockings. Thromboembolic prophylaxis should continue until patients are fully ambulatory.
- Delirium is an important potential complication, especially in older patients with cognitive impairment. Having a high index of suspicion, recognizing patients at risk, identifying the onset of delirium, and treating underlying precipitating factors where possible are all important aspects of management.
- Osteoporosis is typically deferred until after stabilization of the hip fracture. Arranging appropriate follow-up testing and treatment for osteoporosis are important components of medical care for the patient with a fragility fracture of the hip.

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GRAPHICS

Causes of venous thrombosis

Causes of venous thrombosis

Causes of venous thrombosis	
Inherited thrombophilia	
Factor V Leiden mutation	
Prothrombin gene mutation	
Protein S deficiency	
Protein C deficiency	
Antithrombin (AT) deficiency	
Rare disorders	
Dysfibrinogenemia	
Acquired disorders	
Malignancy	
Presence of a central venous catheter	
Surgery, especially orthopedic	
Trauma	
Pregnancy	
Oral contraceptives	
Hormone replacement therapy	
Tamoxifen	
Immobilization	

Congestive failure
Hyperhomocyst(e)inemia
Antiphospholipid antibody syndrome
Myeloproliferative disorders
Polycythemia vera
Essential thrombocythemia
Paroxysmal nocturnal hemoglobinuria
Inflammatory bowel disease
Nephrotic syndrome
Hyperviscosity
Waldenstrom's macroglobulinemia
Multiple myeloma
Marked leukocytosis in acute leukemia
Sickle cell anemia

Drugs causing delirium

Drugs commonly causing delirium or confusional states*

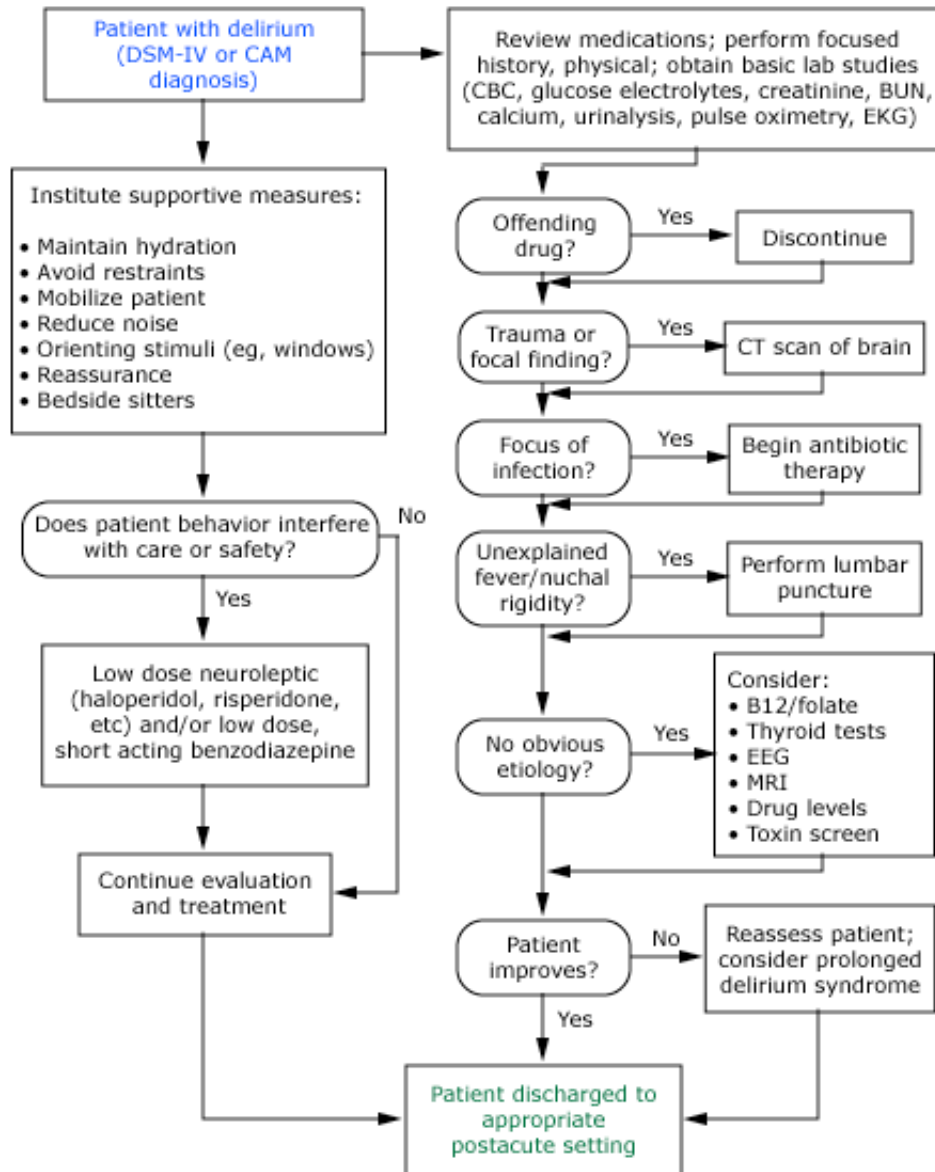
Analgesics	Corticosteroids
Nonsteroidal anti-inflammatory agents	Dopamine agonists
Opioids (especially meperidine)	Amantadine
Antibiotics and antivirals	Bromocriptine
Acyclovir	Levodopa
Aminoglycosides	Pergolide
Amphotericin B	Pramipexole
Antimalarials	Ropinirole
Cephalosporins	Gastrointestinal agents
Cycloserine	Antiemetics
Fluoroquinolones	Antispasmodics
Isoniazid	Histamine-2 receptor blockers
Interferon	Loperamide

Linezolid	Herbal preparations
Macrolides	Atropa belladonna extract
Nalidixic acid	Henbane
Penicillins	Mandrake
Rifampin	Jimson weed
Sulfonamides	St. John's Wort
Anticholinergics	Valerian
Atropine	Hypoglycemics
Benztropine	Hypnotics and sedatives
Diphenhydramine	Barbiturates
Scopolamine	Benzodiazepines
Trihexyphenidyl	Muscle relaxants
Anticonvulsants	Baclofen
Carbamazepine	Cyclobenzaprine
Phenytoin	Other CNS-active agents
Valproate	Disulfiram
Vigabatrin	Donepezil
Antidepressants	Interleukin-2
Mirtazapine	Lithium
Selective serotonin reuptake inhibitors	Phenothiazines
Tricyclic antidepressants	
Cardiovascular and hypertension drugs	
Antiarrhythmics	
Beta blockers	
Clonidine	
Digoxin	
Diuretics	
Methyldopa	

* Not exhaustive, all medications should be considered.

Assessment and Rx of delirium

Assessment and management of patient with delirium



DSM-IV: Diagnostic and Statistical Manual, 4th edition; CAM: confusion assessment method; EEG: electroencephalogram.

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