MENTORS IN ORTHOPEDICS

FEMORAL NECK FRACTURES IN ELDERLY SUBJECTS: KEY PRINCIPLES OF PERIOPERATIVE GERIATRIC CARE

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SUMMARY

Background: Femoral neck fractures represent a significant public health challenge in the elderly, with annual global incidences exceeding 1.3 million. Despite surgical and anesthetic advancements, one-year mortality rates remain between 15% and 30%, often accompanied by severe functional decline, loss of autonomy, and high rates of institutionalization.

Objective: This article evaluates the clinical efficacy and implementation of the Perioperative Geriatric Care Unit (UPOG) model, a multidisciplinary approach designed to optimize outcomes for fragile patients through integrated orthopedic and geriatric management.

Key Points: The UPOG model utilizes standardized protocols to address the physiological vulnerability of patients over 70 years of age. Preoperative priorities include cognitive screening via tools like the CODEX test and ensuring surgical intervention occurs within 48 hours, as delays increase morbidity. Management of comorbidities—specifically anemia, electrolyte imbalances, and anticoagulation reversal—is essential. Postoperatively, the focus shifts to early mobilization, typically within 24 to 48 hours, to prevent delirium, pneumonia, and pressure ulcers. Systematic screening for undernutrition, pain management using behavioral scales, and secondary fall prevention through vitamin D and calcium supplementation are critical components. Evidence indicates this collaborative model reduces hospital length of stay, postoperative complications, and mortality rates at six months.

Conclusion: Integrated orthogeriatric care through dedicated units provides a superior framework for managing the complex needs of elderly patients with hip fractures. Success depends on rapid surgical stabilization, multidisciplinary comorbidity management, and early rehabilitation to maximize functional recovery and reduce long-term mortality.

KEYWORDS

Femoral Neck Fractures; Geriatrics; Perioperative Care; Interdisciplinary Placement; Accidental Falls

1. INTRODUCTION

Femoral neck fractures are a major public health problem and predominantly affect an already fragile elderly population. The worldwide annual prevalence of femoral neck fractures is over 1.3 million.[1] Despite progress in medicine, particularly in orthopedic surgery and anesthesia, the mortality rate remains high and is estimated to be between 15 and 30% in the year following the trauma.[2] Moreover, these fractures often have devastating consequences in the mid- to long-term as regards functional capacity, with loss of autonomy leading to dependence, isolation and transfer into a nursing home. Within one year post-fracture, more than 40% of patients have not returned to their previous level of mobility, 35% are no longer able to walk without assistance and 20% are admitted to a nursing home.[3] Furthermore, elderly patients are at a particularly high risk of developing immediate postoperative complications such as confusion, infections, organ failure or iatrogenic accidents.

For over fifty years, orthogeriatric has developed significantly in order to provide the best possible care to elderly patients with hip fractures and to try to decrease morbidity and mortality. Different models have successively been considered, all based on close collaboration between orthopedists and geriatricians at different stages of patient management (preoperative, immediate postoperative or rehabilitation phases).[4,5] The most effective model, which is also the easiest one to implement anywhere in the world, and that has a sound cost-benefit ratio, involves establishing a unit for perioperative geriatric care (UPOG).[6] This dedicated geriatric unit should be located close to the orthopedic department, and patient management should include daily visits by the surgeon. The principles of care are based on a standardized approach to patients in the preoperative and immediate post-operative phases. Thereafter, the patient should ideally be transferred to a dedicated geriatric rehabilitation center. The efficacy of this model of care has been demonstrated in terms of reduced length of stay and post-surgical complications, improved functional score at 4 months, and reduced mortality during the hospital stay and at 6 months postoperative.[7-10]

2. WHICH ELDERLY PATIENTS BENEFIT FROM ADMISSION TO AN UPOG?

The definition of a geriatric patient is often a difficult concept for a general practitioner to understand. For a long time, the distinction between elderly and young patients was based solely on chronological age. Progress in both social and health issues in developed countries has meant that this single criterion is no longer sufficient to define an elderly patient. A patient over 75 years of age, with no significant history or comorbidities, may thus very well be oriented to the same care pathway as a younger subject, with the same functional results over time. Thus, the notion of fragility must be introduced in order to be able to identify which patients over 70 years of age require special attention and will benefit from geriatric know-how.[11] Fragility is characterized by a decline in physiological reserves and in the function of a number of organs. It is associated with natural ageing but also with pathologies or factors which are now well-known, such as polymedication, sensory disorders and cognitive deterioration. Thus, under normal living conditions, the impact and functional effect of fragility will not be readily discernible, and the patient will remain asymptomatic. Conversely, external stress factors or acute events will increase patient's vulnerability, mainly because of insufficient coping mechanisms. This might lead to organ decompensation, even if no advanced age is present (Fig. 1).

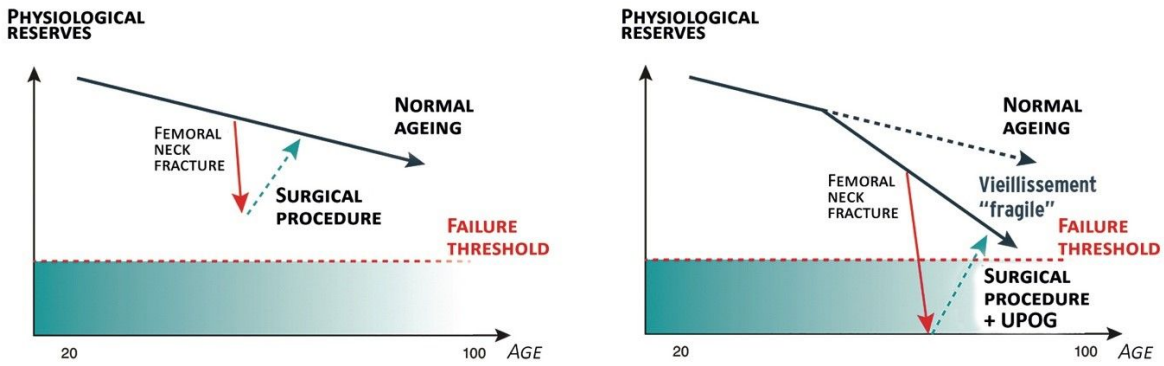

Figure 1: Shows two types of physiological reserves after femoral neck fracture (after Bouchon, 1984).

This defines which patients would benefit from optimized management within an UPOG. However, although geriatric action is beneficial to all these fragile patients in terms of functional recovery, it seems to be that its effect is more pronounced in younger women who had relatively preserved autonomy before their fall.[12]

3. GERIATRIC SURGERY IN UPOGS

Geriatric management is based on standardized protocols and aims to reduce the incidence of major intra-hospital complications and main geriatric symptoms.[13] These protocols are particularly effective in immediate postoperative care, but they may be coordinated as soon as the patient arrives on the ward, prior to the procedure (Fig. 2).

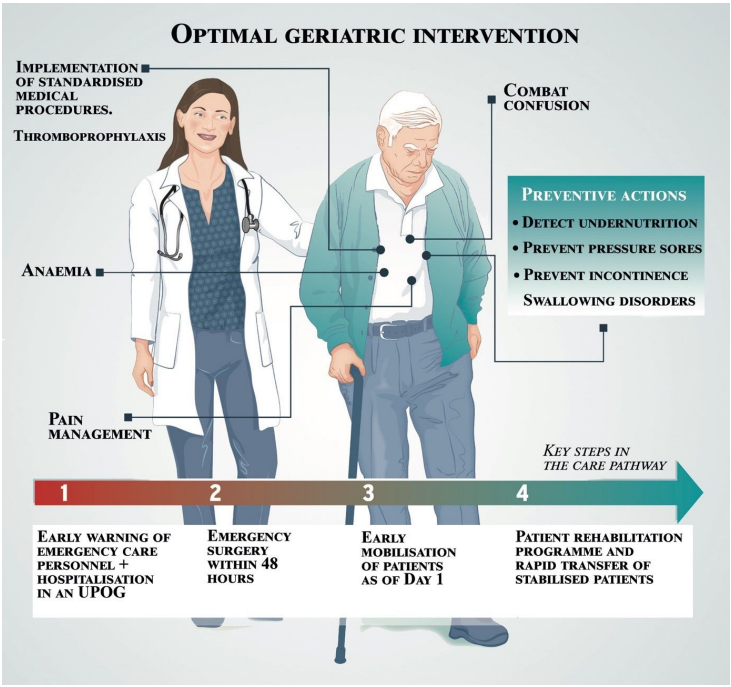

Figure 2

3.1 Preoperative action

Patient conditioning and the surgical procedure are under the responsibility of the anesthetist and the surgeon. During this phase of management geriatricians play only a limited role. They can, however, identify the most

fragile patients awaiting surgery and use their expertise to identify subjects with dementia or mild cognitive impairment that have so far gone unnoticed, as these are predictive of confusion.[14] The practitioner should thus pay particular attention to these patients after surgery and should be able to systematically prevent the risk of delirium. For example, the CODEX (Cognitive Disorder Examination) is a French validated and rapid screening test. It combines the three-word recall test and the simplified clock drawing and enables the detection of early signs of dementia with a sensitivity of 92% and a specificity of 85%.[15]

One of the primary prognostic factors in femoral neck fracture is time to surgery within 48 hours.[16] It should be kept in mind that femoral neck fracture remains a surgical emergency, regardless of the patient's age. Although a careful preoperative review of comorbidities remains essential, it should be as minimal and relevant as possible. Based on a combined assessment by the anesthetist and geriatrician, the main factors of organ decompensation (dehydration, anemia, hypoxemia and electrolyte disorders) must be corrected before surgery. They should be distinguished from factors that will influence early postoperative outcome (cognitive problems, cardiorespiratory and renal insufficiency) which can be managed at a later stage. In practice, this means postponing further tests or more specialized consultations, especially when they are not possible during the time available and are not medically justified. Postponement of the surgery should remain exceptional and should concern only patients with unstable cardiopulmonary decompensation despite correction of risk factors.

Because of the unscheduled nature of femoral neck fracture surgery, the use of anticoagulant and antiplatelet drugs, which is common in elderly patients, is a frequent cause of surgery delay. While the anticoagulant Warfarin can be rapidly antagonized in less than 24h by administration of vitamin K, this is not the case with the new oral anticoagulants or antiplatelet drugs. Determination of the anti-IIa or anti-Xa activity depending on the medication used must be performed at least once daily so that the procedure can be performed as soon as haemostasias is normalized. Unlike aspirin, clopidogrel is generally discontinued even though its effect on operative bleeding and overall blood loss seems to be negligible.[17]

The management of fracture-related pain is naturally another priority, including in patients with cognitive disorders, where pain assessment is more challenging. For these patients, validated tools such as the ECPA, a behavioral scale for the elderly person can be used.[18] Historically, the effectiveness of paracetamol has been underestimated, but it often provides sufficient pain relief. In addition, opioid titration may be required, without leading to an increase in the risk of postoperative confusion.[19] Moreover, femoral blocks are increasingly being performed by trained surgeons immediately upon arrival in the emergency room.

3.2 Postoperative action

Encourage the patient to resume walking as soon as possible.

It should always be kept in mind that one of the key elements of optimal rehabilitation is early mobilization. Normally, the patient should be placed in an armchair the day after the operation and verticalized the following day.[20] Among other things, this limits the occurrence of post-fall syndrome, which associates retropulsion and anxiety and can rapidly compromise autonomy. In addition, delayed ambulation is related to the development of new onset confusion and pneumonia as well as to increased length of hospital stay.[21] Rehabilitation is recommended at first, particularly because of the risk of orthostatic hypotension, and must be adapted to the patient's physical capacity and tolerance. As soon as the patient is stabilized, he/she should be transferred to a geriatric follow-up care and rehabilitation unit, ideally within a dedicated facility. To this end, the transfer request must be anticipated, very often from the day after the operation, and close collaboration between geriatricians practicing in UPOGs and in middle-stay hospitals is a must.

Minimize intercurrent events and early complications

The aim of systematic detection and management of comorbidities and intercurrent events is to begin rehabilitation as early as possible. Geriatric intervention is particularly effective in postoperative confusion syndrome in terms of screening and treatment. Establishing its cause is of utmost importance. First of all, drugs that might cause confusion must systematically be identified (neuroleptics, anticholinergics, class II and III analgesics, etc.) (Table 1).

1- Identification of the drug, cause of the confusion and discontinuation of that drug	**Systematic iatrogenic investigation with prescription review (this is a non-exhaustive list)**	
Class II and III analgesics	Codeine Opioids or analogues Tramadol	
Psychotropes	Tricyclic antidepressants (LAROXYL*, ANAFRANIL*) Neuroleptics +++ and hidden neuroleptics (PRIMPERAN) Benzodiazepine intoxication or withdrawal	
Anticholinergics	Antispasmodics (DITROPAN*, DRIPTANE*) Antiparkinsonians Anticholinergic antihistamines (THERALENE*, POLARAMINE*) Hydroxyzine +++ (ATARAX*)	
Hyponatremiants	Selective serotonin reuptake inhibitor (SSRI) antidepressants Diuretics Proton pump inhibitors (PPIs) Tramadol	
2- Management of symptoms	**Avoid restraint ++, seat the patient in an armchair, remove all devices, provide reassurance, ensure proper hydration**	
3- As a last resort, prescribe short-half-life anxiolytics such as SERESTA* or XANAX*, or a hypnotic at bedtime such as IMOVANE*	'Start low and go slow' Follow the drug titration process ->Start with half-doses ->Gradually increase the dosage	Systematically assess renal function in order to adjust the dosage

Table 1: Iatrogenic confusion.

Other major etiologies such as urinary retention, faecaloma, metabolic disorders, pain or infection should also be eliminated at a later stage, and factors such as advanced age and pre-existing cognitive and sensory disorders should not be overlooked.[22] As for symptomatic treatment, the importance of early verticalization, no physical restraint and appropriate pain management must be emphasized. Oxygen should be systematically prescribed during the first 6 postoperative hours. The administration of short-half-life anxiolytics or of hypnotics, always at low doses, should be discussed on a case-by-case basis.

Anemia is very common during the perioperative period and is one of the main factors of cardiac decompensation. A hemoglobin level of 8–10g/dl should be maintained, but the transfusion process will differ

from patient to patient. Quantitative hemoglobin values should not be interpreted in isolation but should be considered with reference to various comorbidities (ischemic heart disease or cardiovascular disease). Preoperative hemoglobin values should also be taken into account in order to assess their rate of variation, which tends to be predictive of cardiac decompensation. For instance, there is no need for transfusion in patients with no significant history of heart disease, a well-tolerated baseline hemoglobin value of approximately 9g/dl and no perioperative hemolysis. In contrast, patients with coronary disease and a baseline hemoglobin value of 12g/dl dropping to 9g/dl in the days following the operation will be more likely to require a transfusion. Thereafter, iron can be supplemented in patients with low ferritin levels.

In the absence of any contraindications, patients with hip fractures should receive a preventive dose of an anticoagulant to reduce the risk of venous thromboembolic disease for a period of 10 to 14 days. If no severe lower limb arteriopathy is present, elastic venous compression should be applied, especially if anticoagulants are contraindicated. Prevention of pressure sores is of utmost importance. Prolonged unprotected supine position in the emergency room and on the operating table may contribute to their occurrence. Screening for those patients most at risk should be performed using validated scales such as the Braden scale, which consists of criteria that are quick to score by trained nursing staff. Memory foam or alternating pressure mattresses should be used systematically, and adequate dietary management should be instituted.

During this period of management, medications and lack of mobilization may cause slowing of the intestinal and urinary transit which should be assessed daily by performing an accurate clinical examination and if indicated a bladder scan in order to detect bladder distension. Osmotic laxatives should be prescribed in all cases. If no stools are passed for more than three days or if a faecaloma is detected after rectal examination, evacuation is imperative using repeated enemas or even digital extraction if required.

It should be borne in mind that medical procedures in the broadest sense are never risk-free, particularly for elderly patients. Polymedication should be limited, drug interactions should be monitored, and the introduction of new drugs should be resisted or, if unavoidable, must be administered at half doses initially as renal function is often impaired. Intravenous devices should be removed as soon as possible in order to minimize iatrogenic effects. Again, the use of intravesical catheters should be avoided as much as possible but when catheterization is necessary the duration should be limited. Beyond 72h of use, the risk of urinary tract and systemic infections, confusion and incontinence increase significantly and worsens the functional and vital prognosis.

Screening and management of potential comorbidities

Patients should be systematically screened for undernutrition, which is frequently observed in the elderly. It is a potent mortality risk factor one-year post-hospitalisation.[23] Its many harmful consequences include sarcopenia with decreased muscle strength, bone fragility and increased susceptibility to infection. The administration of protein supplements, especially during the preoperative phase of hyper catabolism, is fundamental. The use of a nasogastric feeding tube may occasionally be considered for limited periods in very specific cases. In addition, nutritional assessment should look for swallowing disorders, which significantly increase the risk of aspiration pneumonia. If detected, a texture-modified diet should be introduced.

Patients should also be screened for anxiety or anxiety-depressive syndromes. Their incidence (estimated at about 30% of patients) increases in case of pre-existing cognitive disorders, which are worsened by the syndromes. Treatment should be adapted to patients' specificities and the prescription of antidepressants, a drug class with adverse effects, should be evaluated on a case-by-case basis. If the onset of cognitive decline is suspected perioperatively, the patient should be seen by a specialist for an in-depth evaluation several weeks after the operation in order to avoid any environmental or iatrogenic bias attributable to hospitalization.

The early postoperative phase can have acute consequences on chronic pathologies which are usually under control, such as diabetes or high blood pressure. Because of the lack of physical exercise and a decrease in nutritional or fluid intake, the patient's prescription should be reviewed daily. Antihypertensives should be closely monitored because of the risk of dehydration or orthostatic hypotension. Insulin doses are often decreased and adjusted based on the results of frequent blood glucose checks.

Assessment of falls and secondary prevention

New fall is one of geriatricians' biggest fears in patients with traumatic femoral neck fractures. A full etiological investigation of the fall that caused the fracture should be undertaken as soon as possible. As falls are a major iatrogenic symptom, attributable drugs (such as psychotropics, which may produce excessive myorelaxation and sedation or drugs, which may induce hypotension or a bradycardia) should be examined first.[24] Next, intrinsic factors that may cause gait disorders should be identified (such as neurological or osteoarticular disorders and sensory deficits). Extrinsic factors such as unsuitable footwear, the presence of mobile carpets or bulky objects should also be assessed. If there is any possibility that the fall was caused by a dizzy spell or a loss of consciousness, additional tests such as Holter ECGs, cardiac ultrasounds or brain MRI should be considered. In order to limit the traumatic consequences of a potential new fall, vitamin and calcium deficiencies should be treated. Vitamin D supplementation reduces the incidence of falls,[25] and calcium supplementation in combination with vitamin D reduces the incidence of fractures [26]. Initiation of an anti-bone resorption treatment should be considered when the deficiency has been corrected.

CONCLUSION

The UPOG model is adapted to the complex and intricate problems encountered in elderly patients with acute femoral neck fractures. Within these geriatric care units, a coordinated approach by a multidisciplinary team including geriatricians and orthopedists, standardized gerontological assessments, short surgical delays, early mobilization and stabilization of patients to achieve rapid progression to rehabilitation are all predictive factors for optimal recovery.

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