



ANESTHETIC MANAGEMENT IN HIP FRACTURE: A REVIEW

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Article Received on 06/07/2015

Article Revised on 30/07/2015

Article Accepted on 24/08/2015

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ABSTRACT

Hip fracture is commonest injury occurring in elderly people, due to trivial fall. It is more common in female than males, and its incidences rises with increase in age. Hip fracture is associated with a 12-month mortality of 20-25% a four-fold higher mortality than age-matched community-living controls. Half of these patients suffer decreased mobility and independence following fracture and only a third regain

pre-fracture levels of function Patients presenting with hip fracture commonly suffer chronic medical diseases, and are at high risk of perioperative cardiac morbidity and mortality. Early institution of epidural analgesia in patients with known cardiac disease reduces cardiac morbidity. The provision of epidural analgesia aids mobilization by providing superior dynamic analgesia and reduces postoperative cardiac morbidity. Continuous peripheral nerve blockade is a promising alternative to epidural analgesia but requires further study. With the incidence of hip fracture expected to increase significantly in parallel with an aging population, the anesthetist will continue to be an important part of the multidisciplinary team approach to the management of the patient with hip fracture.

KEYWORDS: Analgesia, Cardiac disease, Elderly, Hip fracture.

INTRODUCTION

Hip fracture is commonest injury occurring in elderly people, due to trivial fall. It is more common in female than males, and its incidences rises with increase in age. One year mortality rate is 20 - 25%, which is four times more as compared to age related general population. About 50 % of these patients suffer from restricted mobility; and only third of them enjoy pre fracture mobility.^[1] This article deals with the reviews of preoperative

management in elderly patients, including initial assessment, resuscitation, and optimization of health.

Pathophysiology of hip fracture in the elderly

Aging is a universal and progressive physiological phenomenon clinically characterized by degenerative change in both the structure and the functional capacity of organs and tissues. The most important aim of peri operative care is speedy recovery and avoids functional incapacitation. Aging involves a progressive loss of functional reserve in all organ systems, to a variable extend. Compensation for age related changes is usually adequate, but limitation of physiological reserve is evident during times of stress such as the preoperative period.^[2]

Coexisting disease, further exacerbating risk in elderly people. They commonly suffer from poor nutrition and generalized infirmity, and are on multiple medications, leading to drug interactions and adverse reactions, which may lead to a fall, resulting in to fracture neck femur.^[3] The incidence of coronary artery disease leading to peri operative myocardial ischemia in patients undergoing hip fracture surgery has been reported to be as high as 35-42%.^[4]

The blood loss from fracture may be as high as 20% of circulating blood volume depending on location of the fracture and its severity,^[5] Dehydration may also be present due to poor oral intake. The resultant hypo volumia due to blood loss and dehydration is underestimated and under treated on many occasion. The post operative stress and pain increase cardio respiratory work, contributing to tachycardia, haemo dynamic instability and hypoxemia.^[3] The oxygen demand supply ratio is further worsened by operative blood loss. The main causes of early death following fracture neck femur are cardiac failure and myocardial infarction, the incidence peak at about 2 days; and pulmonary embolism, peaks during the second post operative week, and bronchopneumonia accounts for the majority of late deaths.^[6] They have highest risk of postoperative delirium with an incidence as high as 50%, depending on the diagnostic criteria. Delirium has been implicated in increased morbidity and mortality in the elderly.^[7]

PREOPERATIVE MANAGEMENT

Assessment of the injury, appropriate fluid resuscitation, and ascertaining the cause of the trauma has be done before taking up the patient for surgery.^[5] Preoperative analgesia is given

to reduce pain. Thrombo embolic prophylaxis is essential as the risk of deep venous thrombosis and pulmonary embolism are very high in this patients.^[8,9]

Evidence from the literature reviewed, suggests early surgical intervention (within 8-24 hours of admission) reduced complications and mortality following hip fracture. Incidences of surgical complications like non-union, a vascular necrosis of femoral head, medical complications like urinary tract infections, decubitus ulcers, pneumonia, venous Thrombo embolism and death in those who underwent early fixation were demonstrated to be much lower.^[10] Also, severity and duration of post operative pain was significantly less in patients who under went surgery within 24 hours of injury.

However, more recent studies by March LM, et al.^[3] have shown no significant difference in mortality between patients having early or delayed surgery after controlling for the severity of comorbid conditions. Furthermore, data from the largest study by Grimes JP et al.^[10] timing of repair showed no difference in outcome between early and delayed repair when corrected for demographic variables and pre-existing medical conditions. There fore delaying surgery up to 3 days to adequately resuscitate patients does not worsen outcome. Urinary catheterization is indicated where there is difficulty in monitoring fluid balance. Parenteral opioids have been used for analgesia following hip fracture. The use of regular Paracetamol is advocated, because it has been shown to reduce total opioids requirement by up to a third following major surgery, with few adverse effects. Caution is advised for the used of NSAID in the elderly due to its adverse effect on renal and platelet function and its deleterious effect on gastric mucosa.

Several randomized trials have examined the role of regional analgesia in the preoperative management of pain following hip fracture. “Three in one” femoral nerve block has been shown to be effective when administered by emergency physicians. Its analgesic effect is reached in half the time and requires less dosage of opioids compared with their controls.

Another study demonstrated that continuous fascia iliaca block significantly improved preoperative analgesia without the need for a nerve stimulator to guide placement. Candal-Couto JJ et al.^[12] Chudinov A et al,^[13] showed that despite the lack of existence of an anatomically defined Psoas compartment, continuous Psoas compartment block resulted in significantly reduced pain scores compared with conventional opioid analgesia. Two randomized controlled trials of epidural analgesia versus conventional opioid analgesia in

elderly patients with hip fracture¹⁴ both trials showed a significant decrease in preoperative cardiac events in the epidural group compared with the opioid group. However, anti Thrombo embolic treatment in the hip fracture elderly patients complicates its indication to these patients.

The preoperative assessment should include, detecting cardiovascular impairment and assessing cardiovascular risk. However, the risk of cardiac death after anesthesia for emergency surgery in the elderly has been studied by Howell SJ *et al.*^[15] A history of angina, acute myocardial infarction, cerebro vascular disease and renal failure was found to double or triple the risk of death following surgery. A history of congestive heart failure was associated with a 14 fold increase in the risk of peri operative death.^[16] Their study utilized Trans esophageal echocardiography in 50 hip fracture patients found that 32% of patients had moderate to severe aortic stenosis which was not previously found on clinical screening the presence of aortic stenosis was associated with a two fold higher mortality at 2 months in this pilot study.^[16]

INTRAOPERATIVE MANAGEMENT

Surgical reduction and fixation is treatment of choice for such patients. It decreases pain, allows early mobilization, and shortens length of hospital stay.^[17] Proper positioning is advised to avoid pressure injuries. Maintenance of normal body temperature is imperative. Antibiotic prophylaxis has been shown to reduce the risk of superficial and deep wound infections.^[18]

Choice of Anesthesia Technique

The choice of anesthetic technique, general anesthesia or regional anesthesia remains unclear. A systematic review of literature found modest evidence of regional anesthesia decreasing the risk of postoperative confusion, but was not able give conclusive evidence regarding other complications, including mortality,^[18] Furthermore, a recent analysis by Foss NB.^[19] *et al* concluded that death was probably unavoidable in 25%-50% of patients. While death was potentially avoidable in the remaining half of the study population, however, more than half of these deaths were the result of withdrawal of active care due to perceived futility of treatment.

The choice of anesthetic and analgesic regimen is decided by anesthetist on case to case basis, in relation patients prevailing medical conditions.

Advantages of General anesthesia

It offers the advantages of greater control over duration, depth of anesthesia, haemodynamic parameters, and complete control over airway and ventilation. It is indicated in patients who are on anti Thrombo embolic prophylaxis or in uncooperative patients.^[5]

A randomized trial to compare induction and maintenance with Sevoflurane, and unilateral spinal anesthesia with 7.5 mg of hyperbaric bupivacaine showed that Sevoflurane provided rapid recovery without any increase in the incidence of postoperative delirium. However, the study found that the Sevoflurane group suffered more intra operative hypotension.^[20]

Another study compared protocol via manually controlled or target-controlled infusion with desflurane anesthesia. This study found that either target-controlled infusion of propofol or desflurane anesthesia following induction with etomidate was associated with the least hemodynamic disturbance.^[21]

Regional Anesthesia

It is a technique, where by incidences of systemic complications, post-operative nausea and vomiting, Thrombo embolic complications and Intra operative blood loss is significantly reduced.^[17] However, the possibility of block failure and complications such as epidural haematoma and permanent neurological impairment, although rare, may be catastrophic.

Traditionally, the initiation of Regional anesthesia, via a single shot spinal technique, is associated with the potential for severe and prolonged hypotension.^[22] However, the reduction of local anesthetic dose and the addition of low dose fentanyl or sufentanil have been shown to decrease the degree of hypotension, but at the expense of greater variability in block height, and increased block failure.^[23]

Epidural Anesthesia

The placement of an epidural catheter and slow, careful titration of local anesthetic has been shown to be more haemodynamically stable than single shot spinals, while allowing titration of anesthesia,^[24] However, epidural placement can be technically difficult in the elderly.^[25]

Continuous Spinal Anesthesia

Several investigators have studied the effect of continuous spinal anesthesia as an alternative to single shot spinal anesthesia or epidural anesthesia. Hemodynamic stability surpasses that of epidural anesthesia or single shot spinal anesthesia due to the ability to titrate blockade

with small, incremental doses of local anesthetic.^[25] Concerns about adverse reactions following placement of spinal catheters is not validated till date. The rate of failed insertion is no higher than with single shot spinals. The post-dural puncture headache rate following use of 20-gauge catheters inserted via an 18-gauge needle was 3.4% in patients aged 60 years in a large prospective study, and was negligible in 70 year-olds in another large study.

Bupivacaine has been proven to be safe in concentrations of 0.25% to 0.5%. Hyperbaric bupivacaine has been shown to be safe and efficient, but the use of normobaric bupivacaine allows for slower onset and more control over segmental spread. Peripheral nerve blockade may be used in conjunction with general or regional anesthesia to decrease intra operative anesthetic requirements and provide post-operative analgesia.^[26]

Peripheral Nerve Block

Peripheral nerve blockade rarely provides satisfactory anesthesia for hip fracture surgery when used alone, there has been a case report of successful anesthesia utilizing combined lumbar plexus and Para sacral sciatic nerve blocks.^[27] A systematic review of the literature found that any approach to blocking the innervations of the surgical area provided superior analgesia compared with opioids alone and significantly reduced total postoperative opioid requirements.

Continuous Psoas Compartment Block

If given for up to 72 hours postoperatively was shown to provide objectively better pain scores and higher patient satisfaction compared with Parenteral opioids in a study by Chudinov A et al.^[12] In a more recent study comparing continuous Psoas compartment block and epidural infusion, Psoas compartment catheters provided analgesia of similar efficacy to epidural catheters, with significantly less intra operative hypotension during general anesthesia. Interestingly, the insertion of Psoas compartment catheters required fewer attempts and less time than placement of epidural catheters. Post operative complications such as urinary retention, orthostatic hypotension, purities and nausea and vomiting were significantly more common with epidural analgesia. Also noteworthy was the quicker time to ambulation achieved by the Psoas compartment block group.

POSTOPERATIVE CARE

Elderly patients with hip fractures in post operative period require closer observation in high dependency care setting. In his study of 68 patients aged 90 years and older, care in a high-dependency setting for about 24 hours significantly reduced in-hospital mortality.

In a study conducted by Sharma PT et al.,^[7] suggested that early detection and treatment of post operative delirium is important because it has been associated with increased morbidity and mortality. He suggested that recovery room delirium should prompt the anesthetist to identify and manage any underlying medical or surgical cause.

POST OPERATIVE ANALGESIA

In a randomized double blind trial,^[28] epidural analgesia within an enforced multimodal rehabilitation program demonstrated superior dynamic analgesia compared with conventional analgesic regimens, and mobilization was not hindered by motor blockade. Epidural analgesia given preoperatively and continued for several days postoperatively, significantly reduce cardiac ischemic episodes and other cardiac events.

There is evidence that the use of clonidine as an additive significantly prolongs the duration of analgesia following nerve block.^[29] This finding however does not apply to Psoas compartment block, where intravenous, but not peri neural administration of clonidine 1 mcg/kg doubled the time to first supplementary analgesic administration, without significant adverse effects. found that continuous Psoas compartment block provided superior postoperative analgesia to conventional opioid analgesia. Another study by Turker G, et al.^[27] found that continuous Psoas compartment block provided similar analgesia to epidural infusion with less motor block and less complications such as hypotension, urinary retention, nausea and vomiting, and itching.

Conclusion and Recommendations

- Hip fracture is a common occurrence in elderly people, and is associated with significant morbidity and mortality.
- They commonly suffer from chronic medical diseases, and are at high risk of peri operative cardiac morbidity and mortality.
- Admission and care in a specialist unit decreases morbidity and mortality.
- Anesthetic technique is to be decided on individual risk-benefit analysis.

- Invasive haemo dynamic monitoring during anesthesia is helpful in optimizing fluid management.
- Postoperative care provided by Multi Disciplinary Team (MDT) with emphasis on early mobilization and rehabilitation programs is associated with better final outcomes.
- Early epidural analgesia in patients with known cardiac disease reduces cardiac morbidity, but the effect on mortality has yet to be ascertained.
- The provision of epidural analgesia aids mobilization by providing superior dynamic analgesia and reduces postoperative cardiac morbidity.
- Continuous peripheral nerve blockade is a promising alternative to epidural analgesia but requires further studies.
- Finally, the incidence of hip fracture is expected to increase significantly, parallel to increase in an aging population, anesthetist will continue to be an important part of the Multi Disciplinary Team (MDT) for the management of the patient with hip fractures.

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