

Role of Preoperative Rehabilitation in Hip Surgeries: A Narrative Review

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ABSTRACT

Hip trauma is a significant cause of morbidity and mortality among elderly patients. In the United States approximately 30 lakhs hip fractures occur each year and this number is increasing each year along with the increased number of elderly population. The management of hip trauma usually depends on the surgical management. However evidence suggests that even with prompt surgical interventions, the post operative complications are common and patient face a great difficulty in post operative rehabilitation. Recently, some of the randomized trials have suggested that preoperative rehabilitation in the form of exercise or the physiotherapy is associated with improved postoperative pain score and decreased hospital stay in elderly frail patients and in patients with associated co morbidities such as diabetes, cardiovascular, or respiratory complications. In this present review we will outline the importance of preoperative rehabilitation in management of different types of hip trauma based on previous study summaries. We will also try to evaluate the importance of such rehabilitation therapy in final outcome of the patients after surgery.

Keywords: Preoperative Rehabilitation, Hip Trauma, Geriatric Population, Diabetes, Cardiac Complications

INTRODUCTION

The hip trauma poses a common challenge to the healthcare system and also to the patients. According to a recent report the number of hip trauma cases has been increased significantly in the past decade. Globally, in 1990 there was 1.31 million hip fracture cases were reported and it is expected that this number will increase to 6.26 million in 2050.¹ In elderly patients and also in patients with many comorbid conditions, hip trauma signifies a potentially catastrophic condition. Following the injury approximately 30% of the people die in the very first year and those who survive bears the burden of lifelong immobility and illness affecting their quality of life.²

In a report published in UK National Hip Fracture database (NHFD) it was found that hip fracture is most common finding in patients who are over 70 years old and majority of them are females. Moreover, it was also reported that patient with hip trauma often have other co morbidities including diabetes, hypertension or immobility or balance issues.³ Several studies have reported the presence of other risk factors that have been shown to be positively associated with the hip fractures among older adults. Seitz et al (2011) have reported that hip fracture is commonly found in older adults who have cognitive impairment and dementia.⁴

Previous studies have stressed on providing a multidisciplinary approach for the effective management

of hip trauma injuries. Several studies have pointed out that in elderly patients a multidisciplinary approach that includes both surgical, medical, nutritional, rehabilitation and cognitive needs of the patients can significantly improve the outcome.⁵ In a recent review it was stressed that patients who had undergone multidisciplinary approach and rehabilitation care had experienced decreased hospital stay, lower complication rates.⁶

In this present review we will outline the importance of preoperative rehabilitation in management of different type of hip trauma based on previous study summaries. We will also try to evaluate the importance of such rehabilitation therapy in final outcome of the patients.

Causes and types of Hip trauma

In adults hip trauma usually results from a direct blow to the side of the hip because of an accident or from a fall. In older adults simple fall can also lead to hip fracture. People who are suffering from any type of bone cancer, osteoporosis or any other injuries with their bones weak are prone to suffer from hip fracture. In severe cases even a mere twisting or standing can lead to a devastating condition of hip fracture. Medically, Hip fracture can be classified into intra-capsular or extra capsular depending on the location of the fracture. Determination of the fracture location is important as it indicates the disruption of the blood supply to the femur head. The amount of displacement and comminution is an important factor that can dictate the level of trauma. The following section will outline the main types of the hip fractures that is commonly reported in all the orthopedic clinic.

Intra-capsular Fracture

A fracture inside of the joint capsule of the hip is called as the intracapsular trauma. This type of trauma usually occurs as the head of the femur. The capsule is the soft-tissue envelop that contains the lubricating fluid of the hip joint.

Intertrochanteric Fracture

This fracture affects the bony structure situated lower to the neck of the femur called as lesser trochanter and usually cross the space between the lesser and greater trochanter. Fracture of this part destroys the muscle attachment points present in both the lesser and the greater trochanter.¹

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Subtrochanteric Fracture

This type of trauma occurs below the level of lesser trochanter. This is a type of injury that affects a larger area in the hip region and during surgical repair this should be taken into consideration.⁷

Table 1 shows the classification of the hip fracture based on the recent AO classification.

Among all these trauma cases the displaced intra-capsular fracture is the most common type of trauma that accounts for almost half of the hip fracture cases reported. In this type of fracture the head of the femur is broken from the neck resulting in decreased blood supply to the femoral head. In maximum of the cases even if the fracture head is repaired the percentage of healing is unreliable.¹

Management of Hip trauma

Management of hip trauma mainly comprises of surgical management. Previous studies have strongly suggested that early surgery is associated with lower risk of post-operative complications and in severe cases even death. Moreover, it was also reported that delay in surgery for more than 48 hours increases the risk of development of pneumonia, pressure sores in elderly patients⁹ and other complications.

Preoperative Rehabilitation

In recent times the preoperative rehabilitation has gained much importance. In UK and in Australia importance of multidisciplinary team approach for hip fracture patients have been recognized. The National Institute for Health and Care Excellence (NICE) guidelines stressed on the importance of rapid optimization of the patient before the surgery.¹⁰ This guideline also mentions that this preoperative assessment should start from the beginning with the involvement of the orthogeriatricians and anaesthesiologists.

Physiotherapy as a preoperative measurement for few hip trauma cases was recommended as one of the treatment options. Preoperative rehabilitation of cardiorespiratory system has showed beneficial results. In osteoarthritis patients undergoing total hip replacement surgery preoperative physiotherapy has proved to improve the outcome.¹¹ Studies have also indicated importance of nutrition as an important factor positively associated with post operative outcome in patients who is subjected to surgical treatment after a hip fracture. Moreover, it was also mentioned that providing the patients with dietary supplementation can significantly improve the nutritional status of the patient and has a positive association with decreased morbidity and mortality.¹²

Surgical Treatments

The management of intra-capsular fracture that accounts for half of the trauma cases in the hip region, femoral head replacement is the most common type of treatment strategy used by physicians.¹³ Recently studies have shown that use of bone cement to keep the structure in place can be

an effective alternative. However, evidence suggests that using bone cement can leads to perioperative mortality and morbidity. In an evidence based study it was reported that this cementing material results in bone cement implantation syndrome (BCIS).¹⁴ Fortunately this is a rare complication and other evidence suggest that patient who have received the cement base material experience lesser pain compared with un-cemented implants.¹⁵

In extra-capsular fracture fixation sliding hip screw is a well accepted method and has been used for a very long time. This type of fixation is an effective procedure for simple, stable pertrochanteric and also for unstable multifragmentary fractures.¹⁶ For more complicated type of fractures such as reverse oblique or transverse patterns the absence of comminution and deficient bone that can share the load of the screw it is difficult to place a screw in the fracture site which can finally lead to mechanical failure. In these patients and in subtrochanteric fractures an intra-medullary nail is inserted that not only offers a more stable construct but also can be used in any set up.¹⁷

Despite of clear guidelines that mentions the use of different type of implants used in types of fractures there remains a clear gap in the evidence based application of the implants for the modern use.¹⁰ In addition to this knowledge gap, studies have also shown that in some group of patients such as elderly patients or patients with known cardiovascular risk the surgical treatment leads to other complications that often hampers the quality of life post operatively.

Limitations of Surgical management

Hip trauma is a common incidence for elderly population and in maximum cases the patients have multiple associated comorbidities that make the situation worse.¹⁸ Generally these elderly population experience an indoor fall. The main limitations of the surgical management is after surgery complications. Despite the advances in the surgical procedures or in the anesthetic procedures morbidity and mortality after a hip surgery is high. Studies have reported a 1-year mortality rate as high as 12% to 33% after a hip trauma surgery.¹⁹ A small part of these is due to the surgical procedure and maximum of the complications arises due to non-surgical procedures. The most commonly experienced complications are pneumonia, delirium, heart failure and pressure ulcer formation.¹⁸

Cardiac Complications

The main factor behind the increased mortality after a hip fracture surgery is cardiac events including heart failure and myocardial infarction. Reports suggest that in aged patients the report of suffering from myocardial infarction is almost 35% to 42%.²⁰ Therefore patients who have previous cardiac complications should be evaluated carefully and a preoperative evaluation, optimization and rehabilitation should also be done before the surgery within a day or two. The appropriate technique of anaesthesia is used after thorough quick preoperative evaluation and optimization or rehabilitation.

Pulmonary Complications

Postoperative pulmonary complication is another concern that affects the clinical course of the patient after the surgery. These are a group of conditions that affects the lung functioning of the affected person. These complications

Type of fracture	Subdivision
Extracapsular	Simple, Stable
	Unstable and multifragmentary
	Subtrochanteric
	Reverse oblique or transverse pattern
Intracapsular	Displaced
	Undisplaced

Table-1: Classification of Hip fracture ⁸

are quite common and can affect 4% of the patients who is undergoing hip trauma surgery. Therefore a preoperative assessment and respiratory optimization that can predict the outcome of the surgery in older patients should be done beforehand.²¹ Preoperative deep breathing exercises and bronchodilator therapies are helpful in reducing the perioperative morbidity and mortality.

Gastrointestinal Problems

The most common gastro intestinal complications faced by the hip fracture patients include reflexes ileum, dyspepsia, abdominal distention, and constipation. A well documented evidence also suggest that in these patients secondary bleeding and postoperative ulcer formation is a common finding.²² Perioperative nutrition and antiulcer prophylaxis is important aspect in perioperative hip surgery patients.

Surgical Complications

Surgical complications categorize the type that arises due to the problem in the procedure. Depending on the fracture type that is whether the fracture is intracapsular or extra capsular the complications differs.²⁰ In intracapsular fractures the main complications arises due to the treatment regimen by osteosynthesis. Mainly two types of complications are seen avascular necrosis and non-unions.²³

In extracapsular fracture several numbers of complications have been reported. However, the most common complications are implant failure, femur fracture, periprosthetic fracture and screw cut-out.²⁴ Among these complications screw cut out occurs in 1.1% to 6.3% patients who are treated for extracapsular fractures.²⁵

Other complications

Among other complications pressure scar formation and anesthetic complications are well documented. The frequently encountered anesthetic complications are cognitive dysfunction,²⁶ neurological problems and hypotension.²⁷ Postoperative early ambulation and DVT prophylaxis will definitely reduce the complications like pulmonary embolism.

Importance of Preoperative rehabilitation

Hip fracture is most common in elderly population and as they have other associated complications it is advised to undergo a presurgical rehabilitation that includes physiotherapy in the form of cardiorespiratory rehabilitation as well as some muscle building exercises. Several studies in the past have discussed that use of therapeutic exercises along with physical therapy can proved to be useful in patients with hip fracture due to osteoarthritis.²⁸

In most of the literature importance of exercise after the total hip replacement surgery have been reported.²⁹ Previous evidence suggest that patients suffering from hip joint arthrosis are less likely to go for preoperative physiotherapy. In contrast, patients undergoing total hip replacement are always interested in participation in post operative physiotherapy sessions. In the same study authors have also reported that preoperative physiotherapy in osteoarthritis patients who are awaiting surgery have a positive influence on the quality of life and activity of selected musculoskeletal indicators.¹¹

In contrast to this study, Gocen et al were unable to find any significance of routine use of preoperative physiotherapy and the education programme on the total hip replacement surgery

among patients awaiting total hip replacement surgery. However, they have reported that post operative transfer was earlier for patients who had received physiotherapy.³⁰

In another study by Ferrara et al. a significant differences were reported in the pain score expressed in the visual analogue scale (VAS) and rotation of external ROM in the hip patients who are undergoing hip replacement surgery and received preoperative physiotherapy. The strength of the abductor muscle was also increased in the study group.³¹ It was also observed that patients undergoing isometric muscle strengthening exercises before a hip surgery experiences significantly improved muscle strength and self-perceived function.³² Moreover it was also observed that preoperative rehabilitation helps in faster recovery and decreases the fear of the surgery.³¹

Hoogeboom et al has opined that in frail elderly individuals who are undergoing total hip replacement surgery preoperative therapeutic exercise can improve the chair-rise time. No adverse events were reported in this study.³³ One study by Matassi et al have reported preoperative exercise improves the surgical outcome and also it decreases the hospital stay.³⁴

In most of the studies that were investigated the efficacy of preoperative rehabilitation before surgery failed to such statistically significant result.³⁵ In a meta-analysis that has investigated the effect of prehabilitation therapy before the hip surgery has concluded that no clinically significant data is presently available on this topic. There is a small difference in post operative pain score or improvement in surgery outcome but this finding is too small to be considered as the clinically important.³⁶

In geriatric patients preoperative optimization has shown to be effective in surgical outcome. An evidence based treatment algorithm that evaluates the possibility of coexisting injuries, cardiac stability and document a preexisting clinical condition is warranted.³⁷

Limitation of rehabilitation

The main limitation of preoperative rehabilitation is the delay in surgery timing. In patients who are undergoing elective surgery this delay can be justified. However, in patients undergoing an emergency hip replacement surgery the delay in surgery time may prove to have disastrous effect.³⁸ Current guidelines suggest that a surgery should be performed within 24 hours of hospital admission.³⁹ In another study it was reported that patients who had a hip trauma surgery within 24 hours experienced less mortality compared with who had faced after 24 and 48 hours.⁴⁰ However there exists a disagreement among clinicians on whether surgery delay has any deleterious effect on the surgery outcome. On the other hand delaying surgery of the elderly patients and patients with preexisting comorbidities may seem to be necessary and a preoperative optimization is needed for their positive surgical outcome.

CONCLUSION

Current literature suggests that in elderly frail patients and in patients with associated co morbidities such as diabetes or cardiorespiratory complications preoperative rehabilitation in the form of exercise or the physiotherapy is associated with improved postoperative pain score and decreased hospital stay. However, no such differences were observed in most of

the measures of patient recovery. Therefore, finding a balance between the prompt surgical intervention and optimization of the patient's medical condition before surgery is the key for future research.

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