Rehabilitation of Fracture-Dislocation of Hip Joint

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ABSTRACT:
Fracture-dislocation of hip joint is one of the serious remedial conditions and often associated with neurological involvement. Its rehabilitation requires a prolonged commitment of around 3-4 months. A case of a successful rehabilitation of a 32 year old male patient (nursing staff Fatima Hospital, BMU) is reported here, who underwent fracture-dislocation of right hip joint. The typical presentation of patient was internal rotation, flexion and adduction of the hip joint, as hip joint was dislocated posteriorly. This report describes the rehabilitation program that resulted in maximum outcome during the period of immobilization. The long term goals of hip fracture rehabilitation were to re-establish the normal anatomy of the hip joint and secondly to restore the functional status of the limb. Different therapeutic techniques and exercises around hip joint helped to maintain the muscular power and range of motion. After removal of skeletal traction, numerous physical therapy sessions improved muscle grading especially hip abductors and quadriceps muscles that resulted in maximum attainment of functional status. Subsequently advanced functional training made the patient to revert to its normal daily life.

KEY WORDS:
Isometric Exercises, DTR, Traction, Heterotopic Ossification, Pelvic Tilt.

INTRODUCTION:
Injuries around hip joint are one of the common musculoskeletal conditions. It is very rare in adolescent and young populations but most commonly associated with old age. Posterior dislocation of hip joint is one of them. A hip dislocation occurs when the head of femur comes out of its articular surface i.e. acetabular cavity. Around 90% of patients, with posterior dislocation of hip joint, present with flexion, adduction and internal rotation of hip joint, along with leg shortening. Whereas anterior dislocation is presented with flexion, abduction and external rotation of hip joint. Physical therapy management is essential after hip fracture. The satisfactory improvement of the patient after closed reduction requires the restoration of normal pelvic biomechanics in the early phase of the rehabilitation program. One of the most crucial conditions which might turn into a serious complication is recurrent dislocation. As acetabulum is the weight bearing portion of hip joint; an early weight bearing might result in recurrent dislocation. Extra care should be taken for weight bearing activities, to achieve the normal lumbo-pelvic rhythm.

Case Summary:
A 32 year old male patient was admitted to surgical ICU of Fatima Hospital of Baqai Medical University, with a history of road traffic accident. The patient was suffering from a fracture-dislocation of hip joint and was shifted to the Surgical I.C.U of Fatima Hospital, after getting emergency treatment from another private hospital. These types of fractures are seen in old age due to osteoporosis but in young age it is rare and often associated with a high energy trauma, as in this case. Clinically patient was suffering from posterior dislocation of hip joint along with the crack fracture of the acetabulum. On physical examination it was noted that the posterior dislocation presents with flexion, internal rotation and adduction. Patient experienced severe hip joint pain, radiating to the groin and leg. After closed reduction, patient was treated with skeletal traction (distal femur) lasting for six weeks. During this period of immobilization he was given therapeutic exercises to prevent future complication, like joint stiffness, muscle wasting, DVT or contracture formation.
RADIOLOGICAL STUDIES:
Radiological study revealed posterior dislocation and acetabular fracture of hip joint (fig. 1.1). The patient with hip dislocation can easily be diagnosed by looking at the position of the dislocated leg. At each follow up x-rays were repeated till the fracture got healed up.

Fig. 1.1: Fracture-Dislocation (posterior) of Right Hip Joint, Fatima Hospital (BMU)

NEUROLOGICAL EXAMINATION:
Around 30-40% of acetabular fractures are associated with sciatic nerve injury due to which patients are unable to move the leg\(^7\). However this patient did not suffer from this complication and had no abnormal neurological or vascular involvement like AVN.

Sensory Examination:
Patient did not suffer from any myotomal or dermatomal alteration and all reflexes were also intact.

Deep Tendon Reflexes:
\(\checkmark\) Patellar: L3-4  
\(\checkmark\) Achilles: S1-2 } Normal

Motor Assessment (MMT):
Manual muscle testing (MMT) was performed to assess the muscle strength of lower extremities\(^7\). As the patient did not suffer from any nerve injury, he had enough strength in his lower extremities. Muscle charting indicated mild-moderate weakness in the following muscle groups that might be due to severe pain and muscle tightness.

\(\checkmark\) Iliopsoas (hip flexors) = 3/5 Right
\(\checkmark\) Gluteus medius and minimus (hip abductors) = 3/5 Right
\(\checkmark\) Gluteus maximus (hip extensors) = 3/5 Right
\(\checkmark\) Quadriceps femoris (knee extensors) = 4/5 Right
\(\checkmark\) Tibialis anterior (ankle dorsiflexors)= 4/5 Right

Biomechanical Analysis:
The biomechanical study of the normal and dislocated hip joint is of great importance\(^17\), because lumbo-pelvic rhythm is mandatory for a normal gait pattern. Due to the fracture of acetabulum, patient presented with Trendelenburg's gait (drooping of the pelvis on unaffected side) due to the weak hip abductors on affected side, to hold the pelvis during walking. A hip joint is a multiaxial ball and socket synovial joint which permits a large range of motions. Beside muscles, extra stability is provided by the strong ligaments and capsule, specifically the pubofemoral ligaments, iliofemoral and ischiofemoral ligaments. These ligaments control various range of motion at hip joint\(^19\).

 Movements at the Hip Joint:
- Flexion(110°-120°) / Extension (10°-15°) = takes place in sagittal plane and transverse axis
- Adduction (30°) / Abduction 30°-50° = takes place in frontal plane and sagital axis (Antero-posterior).
- Internal (30-50°) / External Rotation(50-60°) = takes place in transverse plane and vertical axis.

ORTHOPAEDIC MANAGEMENT:
A hip dislocation is a case of orthopaedic emergency and should be addressed as soon as possible to avoid future complications. The reduction of dislocated hip joint was done within 4 hours. Patient was treated conservatively by closed manipulative reduction of the dislocation\(^8\) and Orthopaedic surgeon recommended skeletal traction (distal femur) for a period of six weeks to heal the fracture of acetabular cavity fig. 1.2, 1.3. The aim of management was to reconstitute the hip joint to provide a stable, painless functional level and to avoid osteoarthritis of hip joint\(^3\). After six weeks skeletal traction was removed and patient did not show any leg length shortening. Bed rest of further 2 weeks was recommended to avoid recurrent dislocation and degenerative changes of hip joint\(^15\). A hip dislocation can have long-term consequences, particularly if they are associated with fracture, as in this case.
PHYSICAL THERAPY MANAGEMENT:
The case report describes the rehabilitation plan of patient after fracture-dislocation of hip joint. Initially physical therapy was started to maintain the range of motion and muscular power around hip joint. During the period of skeletal traction, patellar mobilization and isometric exercises of glutei, quadriceps and hamstring muscles were put into practice. The program further progressed with non-weight bearing, resistance training and stretching exercises, followed by partial weight-bearing activities and full weight bearing after series of radiological study. That resulted in maximum attainment of joint stability.

MOBILITY & STRENGTHENING EXERCISES:
Strengthening and mobility exercises were given at hip and knee joint to prevent post fracture muscle weakness and joint stiffness respectively. Precisely strengthening of the hip abductors, has been correlated well with the final functional outcome. In a literature review it was concluded that muscular strength significantly manipulates muscle physiology and enhances joint stability during movements and offers more ambulatory protection. Consequently strengthening exercises resulted in improvement of balance and proprioception. Strengthening exercises therefore played an important role in accomplishing our ultimate goal i.e., gait training. Strengthening of quadriceps muscle also facilitates functional status of the patient.
WEIGHT BEARING:
As standing causes compression forces on acetabular cavity\(^{18}\), the restriction of full weight bearing was maintained for 2 more weeks, after removal of skeletal traction. Patient was advised for partial weight bearing and step through gait using walking frame.

After a period of 8 weeks, the fracture was perfectly healed, therefore patient was allowed for full weight bearing after 2 weeks of bed rest. Initially patient practiced sit to stand (STS) so that he can develop trunkle stability and neuro-muscular coordination\(^{11}\). According to a study which was conducted to investigate the effects of weight bearing and non weight bearing exercises after hip fracture, similar effects were seen in both groups. The combination of both types of exercise resulted in additional benefits on strength, balance, gait and functional performance\(^{21}\). It is suggested that early weight bearing should be avoided in cases of acetabular fracture, as standing causes compression forces on acetabular cavity\(^{18}\) and should concentrate on non-weight bearing exercises, until the fracture gets perfectly healed.

GAIT TRAINING:
Ambulation is one of the most important components of physical therapy treatment\(^{4,7}\). Initially an antalgic gait pattern was observed as the patient suffered from a fracture-dislocation, which is a very painful condition\(^{23}\). By the end of 2nd month patient was ambulated with a walking frame, with partial weight bearing for two weeks and after two weeks he was encouraged to walk with a cane, until the limp was
disappeared. Patient usually shows scarcity and lack of confidence during balance and stance phase (weight bearing) due to the reduced muscle power around hip joint especially abductor group\textsuperscript{22}. These are some of the factors which make rehabilitation a significant strategy, especially in terms of restoring the mess up functions\textsuperscript{22}.

In general, gait training helps in improving proprioception, muscular strength and balance\textsuperscript{22}.

**FUNCTIONAL TRAINING:**
The physical performance and mobility is the key factor for functional recovery. The functional training started after a series of radiography and removal of skeletal traction, focusing the recovery of pre-fracture functional status, as soon as possible. Early weight bearing after acetebular fracture risks recurrent dislocation of joint, but at the end of the 3rd month rehabilitation programme the patient was able to perform certain challenging task like treadmill training, stairing up and down and wall sliding (eccentric muscle strengthening of quadriceps).
DISCUSSION:
Hip dislocations are often caused by any trauma or automobile accidents, usually accompanied by other injuries, like fracture of acetabulum that can complicate the process of Rehabilitation. This case was associated with acetabular fracture which is recognised as highly variable, in terms of age, gender, sex and fracture type. That is why successful consequences rely on extremely individualized management principles by experienced and skilled team. Some of the complications which are more prone to such conditions are recurrent dislocation, muscle atrophy (wasting of muscle), heterotopic ossification (excess bone), blood clots that can occur in the veins (DVT common complication) and secondary hip arthritis etc. Identification and initiation of therapeutic treatment is very important in order to avoid these complications. Many patients experience long term disability after an orthopaedic management, but physical therapy is the key to restore a patient to its maximum functional status. In Baqai Institute of Physical Therapy and Rehabilitation medicine we have successfully rehabilitated certain patients with this condition. Appropriate preliminary management options are significant for the desired outcome.

A comprehensive literature review suggests that an early failure in subsequent recovery manures can be accompanied by significant morbidity. Rehabilitation is a multidisciplinary effort of a skilful and capable team which includes health professionals such as Orthopaedic surgeon, Physical therapist, Nursing staff, social workers etc. The main objective of this case report is to recognize the effectiveness and validity of physical therapy treatment. Physical therapy helped not only in restoring the functional status of the patient but it is also helpful in avoiding other secondary complications mentioned above. At the same time certain measures like prevention from falls, treatment of osteoporosis, regular exercise training are compulsory for a healthy physical life style.

CONCLUSION:
The successful rehabilitation of patient constituents many early measures like on time emergency and orthopedic management, on time physical therapy commencement etc. In general, hip fractures are associated with poor outcomes due to prolong bed rest but this case report will provide a detail explanation of the appropriate and successful plan of care of post fractured-dislocation of hip joint. As there is no development of traumatic rehabilitation services in our society, therefore it is necessary to look into a new dimension of rehabilitation service which is more successful than the long-established traditional service. The long term goals of physical therapy treatment were not only to resume the functional independence of the patient but also to bring the patient back into the practical life.

REFERENCES:
2. Steven J. Schafer, Laura Ottaviani Schafer, Jeffrey O. Anglen, Martin Childers, Heterotopic ossification in rehabilitation patients who have had internal fixation of an acetabular fracture, Journal of rehabilitation Research and Development, vol. 37 No. 4, July/August 2000.
reviews (Online) 2007, vol (issue 1): pp CD001704, revised 2009/11/03.


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