“OUTCOME ANALYSIS OF NEGLECTED MUSCULOSKELETAL INJURIES”

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CERTIFICATE

This is to certify that this dissertation **"OUTCOME ANALYSIS OF NEGLECTED MUSCULOSKELETAL INJURIES"** is a bonafide record of work done by **DR.K.M.SIVAPRASAD,** during the period of his Post graduate study from June 2014 to June 2017 under guidance and supervision in the **INSTITUTE OF ORTHOPAEDICS AND TRAUMATOLOGY,** Madras Medical College and Rajiv Gandhi Government General Hospital, Chennai-600003, in partial fulfillment of the requirement for **M.S.ORTHOPAEDIC SURGERY BRANCH II** degree Examination of The Tamilnadu Dr. M.G.R. Medical University to be held in April 2017.

Prof. M.K.Muralitharan,
M.S., M.Ch.,
Dean
Rajiv Gandhi Govt. General Hospital,
Madras Medical College,
Chennai – 600 003.

Prof. N.Deen Muhammad Ismail,
M.S Ortho., D.Ortho.,
Director I/C & Professor of Orthopaedics,
Institute of Orthopaedics & Traumatology,
Madras Medical College,
Chennai – 600 003.

DECLARATION

I declare that the dissertation entitled **"OUTCOME ANALYSIS OF NEGLECTED MUSCULOSKELETAL INJURIES"** submitted by me for the degree of M.S ORTHOPAEDICS is the record work carried out by me during the period of January 2015 to August2016under the guidance of **Prof.N. DEEN MUHAMMAD ISMAIL, M.S.Ortho., D.Ortho.,** Director I/C, Professor of Orthopaedics, Institute of Orthopaedics and traumatology, Madras Medical College, Chennai. This dissertation is submitted to the Tamilnadu Dr.M.G.R. Medical University, Chennai, in partial fulfillment of the University regulations for the award of degree of M.S.ORTHOPAEDICS (BRANCH-II) examination to be held in April 2017.

Place: Chennai
Date:

Signature of the Candidate

(DR.K.M.SIVAPRASAD)

Signature of the Guide

Prof. N. DEEN MUHAMMAD ISMAIL,M.S.Ortho., D.Ortho.,
Director I/C, Professor of Orthopaedics,
Institute of Orthopaedics and Traumatology,
Madras Medical College, Chennai.

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INTRODUCTION

INTRODUCTION

Musculoskeletal injuries are major causes of death and disability all over the world, especially in a developing country like India[1]. There is increased incidence of trauma induced musculoskeletal injuries due to various factors like increased usage of motorized vehicles in combination with bad roads[2], accidental farm injuries or workplace injuries, fractures following trivial fall especially in geriatric population and associated co-morbid conditions. Musculoskeletal injuries following trauma is part of a spectrum of musculoskeletal disorders which has become a rising epidemic in a country present in developing stage like India[3]. These disorders as part of Non-communicable diseases[1] are responsible for heavy economic burden on a developing nation[3].

Additionally the neglect of these musculoskeletal injuries not only increases the chance for clinical outcome failure but also adds on to our country's economic burden. The main causes for neglect include general ignorance, poor accessibility of tertiary care, preference for alternative treatment modalities, fear of surgery, monetary reasons, neglect of geriatric population and mentally ill patients who are incapable of taking care of themselves, lack of awareness of recommended modality of treatment, scarcity of specialty trauma care centers[4] and disproportionate doctor patient ratio etc.

General ignorance of their health on the part of patients and their caregivers leads to preferring of simple first aid rather than giving proper attention to their injury. And only when the injury leads to intolerable pain or other symptoms affecting their daily activities do they seek treatment. This time lost due to self-negligence plays a major role in the clinical outcome for the patient.

Accessibility issues are mainly for people in villages or mountainous terrains with poor transport service. These patients usually reach tertiary health care centers very late and sometimes present only after setting in of chronic deformity and disability.

Treatment at the hands of local bonesetters, religious healers and quacks are one of the major causes for neglect. In truth it cannot be completely called as neglect, as the patient have opted for some form of treatment that they believe can cure their ailment. The treatment forms include poultice wrapping, massages, forceful manipulation and rigid splinting techniques. The neglect here comes into the fore when these treatment modalities cause more harm than good and result in unnecessary grievance for the patient. The patients seek specialty care very late in these cases, and they would have lost the precious time by undergoing these alternative treatments. Though in some cases they may produce fairly acceptable clinical outcome but it is not true in all cases.

Here it shows that every fracture is unique and the treatment has to be tailor made for that particular patient.

Fear of surgery is very common even among well-educated individuals leading to neglect of fractures or dislocations. This can be easily overcome with diligent care and counseling and spreading awareness. Patients suffering neglect solely due to financial reasons can be overcome by health schemes by governing bodies to provide financial aid like The Chief Minister's Comprehensive Health Insurance Scheme (CMCHIS) being practiced in state of Tamil Nadu which has been a great boon for the poor and needy. General neglect of old age patients and mentally challenged patients can be overcome only with societal empathy and interventions by government.

These enumerated causes often have a combined role and they have interlinked relationships to result in neglected musculoskeletal injuries, morbidity, financial loss, psychological stress, broken families and finally death in some cases.

The other major cause for neglect or untreated or improper management of fractures is in poly trauma patients with life threatening injuries to the cranium, thorax, abdomen which takes precedence over bony fracture especially if there is a lack of specialty trained personnel, improper facilities in the hospitals[3], misdiagnosed and missed fractures.

The period of neglect varies from few weeks to many years also, and these patients present with various degrees of soft tissue and bony problems. The soft tissue problems include indurated skin, scarred and/or contractured muscles, infection at injury site, fibrosis of soft tissue etc. The bony problems include non-union, bone loss, shortened limbs, deformity, ankylosed joints or unstable joints etc. The treatment of these problems has to be strategically planned and proper management course have to be devised to cover both the soft tissue and bony problems[5].

The soft tissue problems can be treated with repeated skin debridement, skin grafting, fibrosed tissue removal, and treatment of infection to restore almost normal anatomy to the affected limb.

The bony problems needs step wise correction of deformity, stabilization of fractures, bone graft in case of bone loss, treatment of infection, mobilization of adjacent joints in case of joint stiffness, stabilization of joints in case of joint instability etc. which are achieved by employing open reduction and internal fixation and if needed compression- distraction method of Ilizarov in case of nonunion[5].

In spite of all these measures, there might still arise certain problems like improper skin coverage, persistent infection, weeping wounds, implant failure, fracture instability, improper bone healing due to associated comorbidities etc. This may lead to increased hospital stay.

The main aim is to achieve complete healing with mobile joints, almost normal anatomy restoration, good functional outcome with improved range of movement and restoration of maximum daily living activities when compared to the time of presentation.

In our study the focus is on periarticular unreduced fractures, fracture dislocations, and isolated neglected dislocations with an overall period of neglect of minimum 1 week. The previously described causative factors are going to be studied in detail and the proportion of neglected injuries for each factor is proposed to be calculated for the given study period separately. These patients were included based on set criteria and patient specific management protocol was devised to achieve better clinical, functional and radiological improvement when compared to the parameters during the time of presentation. The outcome variations with age, gender, limb involved (upper limb/ lower limb), side involved (dominant/ non-dominant), duration of neglect, reason for neglect, were all studied. This study also aims to devise counseling and awareness spreading techniques to prevent the causative factors therefore decreasing the occurrence of burden due to neglected musculoskeletal injuries.

AIM OF THE STUDY

AIMS AND OBJECTIVES

- To determine the proportion of neglected musculoskeletal injuries during the study period.
- To identify the most common cause of neglected musculoskeletal injuries in our study
- To establish the period of neglect within which a reasonably better outcome can be predicted for the patient in the pre-interventional stage.
- To compare the outcome in case of isolated dislocation and fracture dislocations in neglected injuries, by comparing the functional evaluation scoring system.
- To identify whether Age and Gender play a role in the neglect of fracture/dislocation and their outcomes.
- To establish the advantage of clean surgical techniques over irrational native treatment methods especially in periarticular injuries.
- To educate patients about the importance, advantages and need for immediate care in musculoskeletal injuries and consequences of neglect.

REVIEW OF LITERATURE

REVIEW OF LITERATURE

Musculoskeletal injuries are disorders that affect muscles, bones, nerves, tendons, blood vessels, ligaments, cartilage, joints where the motor system functioning is distorted. This may be due to various reasons like high velocity injuries, medical illness and even simple slip and fall[1]. These injuries once sustained have to be managed in an ideal step wise methodology[5] where the sole aim is to promote functional fracture healing with good clinical, functional and radiological outcome.

In India there were 8,50,000 deaths in the year 2005[6] due to road traffic accidents, in that the ratio of minor injuries: serious injuries : deaths were 50:20:1[7]. The injuries needing hospitalization as well as minor ones can get neglected but most of them fall into minor injury category.

There were approximately 70,000 traditional bone setters in India in the year 2002; they treat around 60% of trauma patients, majority of them having minor bony injuries[8].

In the year 2011, a goal of the National Health Policy was to spend 8.5% of the GDP expenditure on health system[9], which was just 5.1% in the year 2001[7]. Fracture healing, due to the cost of equipment, materials required, training of the medical and paramedical personnel, Research and development involved, is a costly affair[6]. And the treatment is also not resource efficient, since the resource involved may not be completely

utilized due to a high demand and low resource environment that India exhibits. Fracture treatment resources are low in urban centers and virtually non-existent in rural centers.

The affected individuals may seek primary care initially or directly seek tertiary specialty care. But this does not happen often as the patient may opt for conservative treatment which may not be the ideal management for that particular injury or opt for treatment at the hands of native quacks or bone setters, whose mode of treatment may fail to promote fracture healing. The care given can be substandard due to reasons like inexperienced personnel, lack of specialty personnel or specialty treatment facilities. In some cases the injury could have been misdiagnosed or completely missed at the time of presentation. In case of patients suffering from multiple system injuries, the life endangering conditions may take importance over minor musculoskeletal injuries, these minor musculoskeletal injuries may have been treated but would not have been accorded recommended management protocol which could result in persistent orthopedic complaints.

Alternative treatment methods play a major role in increasing the prevalence of neglected musculoskeletal injuries. In India especially many ancient and traditional treatment methods are widely practiced. The traditional Bonesetters famous in Tamil Nadu practice the “putturkattu” bone setting technique[10]. Though many centers practice these techniques

of fracture healing only some are trained in that field, rest are providing service with mediocre training and improper technique only.

The reasons for the patients seeking these treatment methods is because of its long period of existence which makes the local people believe in those techniques and that belief is universally prevalent among their family and friends. These treatments are also easily accessible and financially compatible[11,12].

The treatment techniques followed include massage, forceful manipulations, poultice application, and rigid immobilization with bamboo sticks or plaster of Paris[13].

For minor injuries that are not life threatening, people tend to turn towards more easily available, traditionally styled, orthodox native bone-setters. This league also includes quacks, religious men, and masseuse who are totally inexperienced, and may even do more harm. And at the end of the day they manage to live with any kind of disability resulted with acceptance[11]. There may even not be a major problem if the injury involves the shaft of the long bones, but when it comes to the periarticular injuries or bony injuries with associated open wounds the outcome is very poor causing a great morbidity for the injured[15]. The complications are innumerable from a spectrum of infective complications causing chronic osteomyelitis to infective nonunion to even infective gangrene resulting

in loss of the limb: otherwise it may complicate by not uniting or uniting in a malposition causing a great deal of concern[16,17,18].

In a study made by Ventevogel in central Ghana (Ventevogel 1996), in which 94% of people who were interviewed preferred to consult a Traditional bone setter for a simple bony injury out of which 57% were determined to even present a complicated fracture to them. They all concurred to visit a hospital only if there is a mortal injury[15].

Other causes for neglect are in cases of geriatric patients and mentally ill patients who have no caregivers to take them to a hospital are also highly prevalent. These cases get neglected because of lack of awareness among the care givers and social neglect.

In all these cases the musculoskeletal injuries sustained may be treated but they may not follow the advised protocol for that particular fracture treatment and therefore fracture healing failure takes place.

Fracture healing is a complex process, which results in regeneration of surrounding bone and soft tissue as a response to injury[19]. This healing can take place by primary healing and secondary healing.

Primary healing is also known as direct bone healing or primary cortical healing. This is achieved by perfect anatomical reduction of the fracture with good compression of fracture fragments and considerable decrease in strain between the fracture fragments, which is done by stable fixation. Danis[20] described this as “soudure autogene” or “autologous

weld". Here the main mechanism involves absence of external callus formation and lamellar bone formation directly across the fracture line causes their slow disappearance.The direct bone healing process depends on factors like perfect stability and excellent vascularity. But this perfection is very rarely attained so a combination of contact healing and gap healing play a role in direct bone healing.

Gap healing involves growth of vessels and mesenchymal cells in the stable gaps, which becomes the osteoblast, the osteoprogenitor cells. The woven bones formed in these gaps are traversed by cutting cones[21], which consists of osteoclasts followed by osteoblasts and blood vessels. These act as remodeling units which help to regenerate bone at deficient sites.

Contact healing involves inter fragmentary contact due to compression and anatomic reduction. The interrelationship between gap healing and contact healing establishes direct bone healing.

The normal fracture healing can be explained as a 6 staged phenomena as explained by Heppenstall[22] which are:

- Impaction
- Induction
- Inflammation
- Soft callus
- Hard callus
- Remodeling

Impaction leads to initiation of chain events of fracture healing. Induction leads to unfolding of cellular events responsible for fracture healing. Inflammation involves secretion of inflammatory cells for mediating osteogenesis.

Callus formation

Fibrin framework of hematoma is replaced by granulation tissue. Mesenchymal cells at the fracture site proliferate and differentiate forming callus[23]. Callus consists of fibrous tissue, cartilage and woven bone. Soft callus is converted into hard bone by enchondral ossification. Woven bone is then converted into lamellar bone.Compression discourages the fibrous tissue formation. Shear forces help in calcification of the fibrocartilage.

Remodeling

This is the final stage. It is the conversion of woven bone to lamellar bone and follows the resorption of unwanted callus. There is then a minor modification of internal architecture.

Factors influencing repair of fracture[19] are depending on

i) The type of injury- open fractures, injury rigorousness, articular involvement, segmental fracture, soft tissue interposition, blood supply damage.

ii) Patient variables like age, activity, nutrition status, systemic hormones, medical comorbidities, smoking, drugs, and head injury.

iii) Tissue factors - form of bone, certain bone disease.

These are common determinants of fracture healing. But there are certain special factors, which play a major role especially for neglected musculoskeletalinjuries. These factors have a direct role on influencing the features specific for failed fracture healing[19]. Because of the failure in fracture healing the patients are left with persistent orthopedic complaints that make them seek medical attention.

The special factors specific for neglected skeletal injuries are:

- Vigorous massage techniques practiced by quacks leading to myositis ossificans
- Prolonged, unjustified conservative treatment
- Improper reduction of fracture dislocation, malpositioning
- Persistent infection
- Inadequate immobilization or very rigid immobilization
- Timing
- Damage to blood supply
- Forceful manipulation after 10 days which is deleterious to the growth plate in pediatric fractures
- Home remedies
- Financial constraints
- Missed diagnosis

- Comorbidities like chronic renal failure,rheumatoid arthritis, severe osteoporosis
- Psychosocial problems – destitute, beggars, mentally ill patients.

The common features and complications[14,15,16,17] seen in neglected musculoskeletal injuries are

Soft tissue distortion with deformity

Rigid immobilization is against physiology. Rigid immobilization offered by a plate fixation delays healing and forms weak callus, the bone in the undersurface becomes porotic and increases the risk for re-fracture. Rigid immobilization also atrophies the muscle.

Articular surface damage

Repair of damaged cartilage is not effective in the body which is attributed to lack of sufficient stem cells and inadequate blood supply. The structure, organization and composition in an articular cartilage injury can never be recreated. But still, the fibrocartilagenous scar produced may give a clinically satisfactory result. If the step-off produced in an articular injury is more than the thickness of articular cartilage at that site, symptoms like locking, instability, and catching may occur. Post-traumatic arthritis may develop because of its relationship to the injury severity of subchondral bone in an injured joint.

Neurovascular complications

Nerves are very commonly damaged due to nerve compression or trapping resulted from improper reduction and forceful manipulations at the hands of bonesetters and quacks. Blood vessels damage is also common which may lead to avascularity and failure of bone healing.

Bony changes

Due to prolonged immobilization, disuse and limited range of activities osteopenia may result which may further complicate fracture healing.

Myositis ossificans

'Myositis' term means muscle inflammation and 'ossificans' means bone formation. It is a benign localized reactive, non-neoplastic, fibrous, osseous and cartilaginous proliferative lesion within the soft tissue sometimes in periosteum forming new bone, after trauma[24]. It is a heterotrophic calcification and ossification of muscle. It is uncommon in children less than 10 yrs[25].

Myositis ossificans mature from inside to outside i.e. core is composed of immature osseous tissue, while the most superficial region is composed of most mature osseous tissue – this is called the Zone phenomenon.

In India forcefulmassage and manipulation of the involved region by native bonesetters is a major cause. 4 months appears to be the mean time required for its occurrence.

Compartment syndrome

It is defined as "Increased pressure in a confined space causing compression of tissue, vasculature and nerves leading to anoxia, necrosis and functional deterioration"[26,27]. In case of neglected musculoskeletal injuries, untrained personnel or traditional bonesetters when they apply tight bandages or follow rigid prolonged immobilization techniques, they may precipitate compartment syndrome. Open fractures also have almost the same frequency of occurrence of compartment syndrome as closed fractures. DeLee[28] found that 6% of patients with open tibia fractures developed compartment syndrome, compared to only 1.2% in closed fractures. Blick et al[29] reported even a 9.1% incidence in 198 open fractures of tibia. McQueen found there was no significant difference in tissue pressure between open and closed fractures. It may result in atrophic nonunion of bones which may require specialized techniques like transposition bone grafting[30].

In this study we had studied all the cases with neglected periarticular fractures and joint dislocations. The factors which determine the treatment protocol for these patients are:

- Age of patient
- Duration of neglect
- Co-morbidities
- Required Functional capacity
- Intra op findings

As in our hospital the neglected cases were all treated with recommended procedures tailored for each patient which had inter patient variability, the literature regarding only neglected joint dislocation and associated fracture dislocations involving the joint space, the common clinical findings and complications seen in these cases and the outcome for each joint involvement is reviewed here.

UPPER EXTREMITY

Neglected injuries involving shoulder joint:

Among shoulder dislocations anterior dislocation is more common than posterior dislocation[31] but in case of neglected dislocations posterior becomes the most common[32] because its diagnosis is missed in up to 50% of cases[33]. The neglected unreduced dislocations are common in patients more than 50 years because of the soft tissue weakness prevalent among the gleno-humeral joint. In younger people it is common in alcoholics, epileptics, multiple trauma patients. The trauma history may be a trivial injury; it may be associated with fractures involving the glenoid or humeral tuberosity[34].

Clinical findings and complications[34]

Shoulder joint is of synovial type where a large humeral head articulates with a smaller glenoid cavity. There are static and dynamic factors involved to maintain joint stability. The rotator cuff stabilizes and fixes the fulcrum against which the deltoid can act and elevate the humerus. Articular surface being spherical and is only covered up to 160° by cartilage. The radius of curvature of the glenoid surface is greater than, (less curved) that of the humeral head. It also has a relative superior inclination compared to the vertical axis of the scapula, which may result in prevention of inferior instability of the shoulder joint. The glenoid is deepened by the capsule and labrum.

Even though the shoulder is a highly mobile joint, due to the size mismatch between the glenoid surface and humeral surface and looseness of the capsule, range of motion may get severely impaired in case of chronic isolated dislocation and fracture dislocations. The problems and complications increase with the chronicity of dislocation. In old neglected dislocation or fracture dislocation involving the shoulder joint the common findings are soft tissue contracture around the joint, impression defect on humeral head, glenoid cavity filled with fibrous tissue and the head may be resorbed post avascular necrosis. Approximately one-third of the patients present with neurological deficit in these cases. These patients clinically present with a loss of motion. They may be

asymptomatic except pain accompanied with loss of range of motion. In old anterior dislocation abduction and internal rotation is restricted. In old posterior dislocation abduction and external rotation is restricted.

Closed reductions are attempted if the duration is less than 3 weeks[31]. But when the duration of neglect is more than 4 weeks and impression defect is more than 25% open reduction is preferred[31,32]. The management protocol for the in between period of 1 week depends on subjective evaluation and the opinion varies among various literature reports. Even minimal traction in elderly can produce rupture of neurovascular structures[34]. After closed reduction the joint is immobilized for 6 weeks, according to Rowe et al[35] in case of anterior dislocation the arm is immobilized anterior to the axis of the body and in case of posterior dislocation the arm is immobilized posterior to the axis of the body.

Functional range of motion[36]

Functional range of motion required is usually less than the anatomical range of movement. According to University of Pennsylvania shoulder score 120° of forward elevation 45° of extension 130° of abduction 150° of cross body adduction 60° of external rotation and 100° of internal rotation is considered sufficient for uninterrupted daily activities.

Outcome analysis

In cases of neglected shoulder dislocations with varying duration of neglect, they were all treated by different procedures. Some studies have also questioned the importance of surgery like Shah et al[37]. Most of these studies have followed Rowe and Zarin[35] scoring system as followed in this study also.

Chatterjee ND[38] et al had conducted a study among 26 cases of neglected shoulder dislocation. Out of which 23 were anterior and 3 were posterior dislocation. In them10 had associated fracture where 5 had associated fracture neck of humerus and the remaining 5 greater tuberosity fractures. These patients were evaluated based on a score devised by the authors in whom 16 had good outcome, 6 had fair and 4 had poor outcome. Complication faced were superficial wound infection in 4 cases, axillary artery damage in one case, AVN of humeral head in 5 cases, stiffness of gleno-humeral joint in 4 cases and mild muscle wastage around shoulder joint in all cases.

Goga IE[39] studied on chronic shoulder dislocation on 31 patients, diagnosed with chronic anterior subcoracoid dislocation in 30 and chronic posterior dislocation in one patient. The duration of neglect varied from 6 days to 2 years. The procedure done were closed reduction in one patient, open reduction in other cases and 10 patients had no procedure done and their shoulder joint was left unreduced. Follow up period was for more

than 2 years and the outcome assessed by Rowe and Zarin system showed surgical treatment was better than watchful neglect irrespective of duration of dislocation and age of patient. And the entire patient group had no resulting neurovascular complications.

Mansat et al[40] study of 5 cases of neglected anterior shoulder dislocation with duration of neglect ranging from 6 weeks to 36 months showed that a procedure of open reduction with reinsertion of capsulo-labral complex on to the anterior glenoid rim, with 25 months of follow up - excellent outcome in one case, good in 3 cases and poor in one case based on Rowe and Zarin system of scoring. Pain score also showed an improvement.

Abdelhady et al[41] conducted a study in 4 cases of neglected anterior shoulder dislocation with average duration of neglect of 14.7 weeks. The procedure done was open reduction with remplissage and Putti-Platt procedure in 3 cases and in one case Latarjet procedure was preferred due to the presence of prominent Hill Sach's lesion. The follow up of the patients ranged from 25 to 47 months and the patients were evaluated using Constant score showing good outcome in all cases.

Chaudhary et al[42] case report of anterior shoulder dislocation of 6 months duration on which open reduction and Latarjet procedure with bone graft was done showed good outcome at the end of 1 year.

Rouhani et al[43] conducted a study among 8 patients with chronic anterior dislocation of shoulder with mean duration of neglect of 10 weeks who all underwent open reduction and capsulo-labral complex repair showed excellent result in 4 cases, good in 3 and fair in 1 case following Rowe and Zarin scoring system.

These studies showed that irrespective of duration of neglect open reduction with adjuvant procedures had a better outcome than non-operative or watchful neglect.

Neglected injuries involving elbow joint:

Elbow anatomy has complex bony and ligamentous structures and hence restoring their anatomical and functional stability is a challenging task even in acute situation[44]. When the injury is neglected or has been treated by native treatment with associated complications it becomes a monumental task.

Most common problems associated are joint stability loss, stiffness, heterotopic ossification, nonunion and malunion around elbow, nerve damage, and joint arthritic changes.

Clinical findings and Complications

Loss of elbow stability

Loss of elbow stability results from injuries like ulnohumeral dislocation or complex fracture dislocation. According to Heim stability

of elbow joint depends on ring of four columns[45]. A loss of ring stability around it results in joint instability.

The four ring columns are:

- Medial ring consists of medial collateral ligament complex, medial epicondyle.
- Anterior ring consists of coronoid process, anterior capsule and brachialis
- Lateral ring consists of radial head, capitellum, and lateral collateral ring complex
- Posterior ring consists of olecranon process, posterior capsule, and triceps.

O'Driscoll[46] suggested that elbow joint's loss of stability is a result of the disruption in continuity of varus-valgus load, supination and pronation, and finally ulnohumeral flexion and extension when associated with axial load.

Elbow stiffness

Due to the complex anatomy and increased chance for congruity and conformity loss post trauma elbow joint most frequently goes into contracture and stiffness. This has been attributed to the increased cross linkage between collagen in combination with decrease in water and proteoglycan content[44].

Elbow stiffness is classified by Morrey[47] as follows:

Extrinsic-

Sparing of joint surface is seen.

- Soft tissues- capsulo-ligamentous and muscular
- Ectopic ossification

Intrinsic-

Associated with intra articular fractures due to loss of articular cartilage from avascular necrosis in case of gross distortion from inadequate or failed reduction.

Heterotopic ossification

Heterotopic ossification is the presence of bone in soft tissue where bone normally does not exist[44].

Hasting's classification of heterotopic ossification in elbow is as follows:

Class I: Radiologically evident elbow ectopic ossification without clinical limitation

Class II: subtotal, functional, limitation of motion

A: In flexion and extension plane

B: In pronation and supination plane

C: In both planes

Class III: Ankylosis that eliminates motion

In neglected cases, complex instability per se persists, and the presence of fibrosis, arthritic changes, ankylosing changes, myositis ossificans, and further degenerative joint disease complicates this process.

Functional range of motion[47]

According to Morrey, Range of motion necessary for an individual to perform 90% of normal daily activity is:

Arc of elbow flexion of 100°ranging from 30° to 130°

Arc of forearm rotation of 100°, ranging from 50° pronation to 50° supination.

Based on these findings it can be concluded that in case of:

a) Duration of neglect longer than 3 months- onset of articular cartilage degradation is seen.
b) In long standing dislocation: Triceps V-Y plasty leads to post-operative flexion contracture but is useful.

Outcome analysis

In a study conducted by Mahaisavariya[48] in Thailand, patients who had undergone native treatment where traditional bonesetters had treated elbow dislocations with bamboo and cloth splint by manipulating them into extended position without reducing the dislocation and immobilize them for a considerable time period. The patients presented with severely

limited ulnohumeral motion. The management involved operative reduction with triceps V-Y plasty, debridement of interposed granulation tissue and repair if collateral ligament in possible cases were done. In case of grossly unstable joints ulnohumeral or humeroradial transfixing pin was placed. The removal of pin and mobilization was initiated after 2-3 weeks.

Nicola et al[49] conducted a study among 16 patients with neglected posterior dislocation with duration of neglect 2-48 months. They all underwent open reduction and Speed's technique. After a follow up period of 12-36 months all patients showed improvement in range of motion but 1 patient had joint instability in the rehabilitation stage.

Kanakraddi[50] studied a case of neglected unreduced posterior elbow dislocation with associated radial head and coronoid process fracture. The patient underwent total elbow replacement and post follow up period of 6 weeks the patient showed range of motion 20°-140° with associated minimum pain.

Kapukaya et al[51]conducted a study among 20 patients with old elbow dislocation with duration of neglect ranging from 25 to more than 45 days. The patients underwent open reduction and kirschner wire fixation with triceps lengthening procedure. After a mean follow up period of 39.1 months the group having neglect duration < 45 days

showed good outcome and the group having neglect duration > 45 days showed fair outcome.

Islam et al[52] studied 13 patients with old unreduced posterior dislocation of elbow of neglect period > 3 weeks. The procedure done was open reduction and K wire fixation with or without triceps lengthening. After a follow period of 18 months the outcome, as shown by Mayo elbow performance index (MEPI), was excellent in 6 cases, good in 5, fair in 1 and poor in 1 case.

Bansal et al[53] studied 3 cases of neglected dislocation of elbow with mean neglect period of 5 months. The procedure done was Speed technique with injection of steroid in the joint space. After a mean follow up of 10 months MEPI showed excellent outcome in 2 and good outcome in 1 patient.

Coulibaly et al[54] study on 22 patients with old unreduced dislocation of elbow with period of neglect ranging from 2 to 17 months. The authors tried a new approach technique i.e. paratricipital. The procedure done was open reduction with triceps lengthening in some cases and triceps V-Y plasty in other cases. After a follow up of 21 months MEPI criteria showed excellent outcome in 14 patients, good in 4 patients, average in 2 patients and poor in 2 patients.

Hence, these studies show that attainment of good functional outcome in an neglected elbow injury is possible by following:

a) Prompt reduction,

b) Limited brief immobilization,

c) ROM exercise as soon as possible.

Neglected injuries involving wrist joint

Distal radius fractures leading to wrist injuries form 8% – 17% of injuries reported in emergency department[55]. And these injuries get into complications also very commonly i.e. 23% - 31%, because of its anatomical complexity and difficult restoration of joint biomechanics post trauma[56]. Distal end of radius has 3 articular facets. They are scaphoid fossa, lunate fossa, and sigmoid notch. The normal axial load distribution is 80% in radius and 20% triangular fibro cartilage complex. With increasing knowledge about the wrist joint biomechanics the betterment in the post trauma quality of life is possible.

The reasons for increased morbidity in wrist joint injuries are:

- Difficult reduction
- Marked comminution
- Severe osteoporotic changes
- Distal radio ulnar joint disruption
- Inadequate immobilization

Clinical findings and complications

The most common features of neglected injuries involving wrist joint seen are:

- Malunion
- Wrist instability
- Deformity
- Neurovascular complications
- Osteoarthritic changes
- Reflex sympathetic dystrophy

Distal radius malunion

Malunion is the most common complication seen in distal radius and ulna fractures. Non surgically treated or neglected injuries 23% of the times end up as malunion[56]. Distal radius malunion can be extra articular, intra articular and rotational malunion. The extra articular malunion are further classified as:

- Dorsal malunion
- Volar malunion
- Ulnar angulated malunion

Intra articular malunion is a manifestation of residual joint incongruence[57]. Radiologically>1-2 mm of residual intra articular step off after healing of distal radius fracture produces symptoms, which require

intervention. In case of older patients who suffer low energy trauma, only a mild incongruence exist which is compatible with a fair quality of life. But in case active young adults the complication of increased incongruity is seen which results in radio carpal arthritis that can be radiographically visualized. These result in poor outcome and decreased functional capacity[57].

Rotational malunion consists of dorsal angulation and volar angulation. The dorsal angulation results in supination deformity and the volar angulation results in pronation deformity.

Wrist instability

Wrist instability is characterized by two distinctive patterns. They are:

- Dorsal radiocarpal subluxation with normal mid carpal alignment
- Adaptive mid carpal and dorsal intercalated segment instability deformity (DISI)

Poor functional outcome is seen in patients with radiological finding of radiolunate angle >25°.

The DISI deformity is characterized by wrist flexion deformity at midcarpal joint as a compensatory mechanism. There is a deficit of wrist flexion and forearm supination in this deformity.

Wrist deformity

Due to the improper reduction and neglect the wrist sets into a deformed position.

The acceptable levels of deformity in radiological examination are[56]:

- Radial inclination – 15° change, which can be either increased or decreased.
- Radial length – 4mm
- Ulnar variance -4 mm
- Dorsal volar angulation - 15° dorsal
  - 20° volar
- Articular congruity ≥ 2mm gap/ step off

Osteoarthritis

This is characterized by joint destruction post an episode of traumatic injury in wrist joint. It results from degenerative changes in the cartilage and hypertrophic bone changes.

It can result from scapholunate advanced collapse, which is most common. Other form is scaphoid non-union advanced collapse. It results also from intra articular fracture of distal radius or ulna.

Reflex sympathetic dystrophy

This a syndrome characterized by burning type of pain, swelling and vasomotor dysfunctions like sweating, cooling and flushing. This syndrome occurs posttraumatic injury and runs a variable course.

In case of acute presentation, which is characterized by radiological finding of mottled decalcification or osteoporotic changes, it becomes a contra indication for surgical procedures.

The goals of treatment for neglected wrist injuries are[56]:

- Pain free wrist
- Required functional demands restoration

If the patients already have no pain and are able to live with the deformity then surgery is not advised for them[56].

Contraindications for surgery include:

- Complex intra articular deformity
- Severe osteoporosis
- Advanced post traumatic osteoarthritis
- Poor overall health.

Functional range of motion

Ryu JY et al[58] study on 4 normal individuals by using Biaxial wrist electro goniometer the functional range of motion was determined.

Extension 60°

Flexion 54°

Ulnar deviation 40°

Radial deviation 17°

Acceptable range of motion

70% of maximal range of wrist motion

40° of each flexion and extension

40° of combined radial and ulna deviation

Outcome analysis

Trumble et al[59] studied a case series of 49 patients with neglected complex displaced intra articular distal radius fracture. The procedure done was reconstruction of articular congruity and internal fixation and also in some cases external fixation was done. The outcomes after follow up period of 22 to 69 months showed pain relief and a combined scoring of grip strength and range of motion 76 ± 19% of contralateral side.

Ring et al study[60] on 23 patients of intra articular distal radius malunion with neglect of 6 months showed that post corrective osteotomy excellent to good results were seen in all cases with score of 83% according to Fernandez scoring system and Gartland and Werley scoring system and 43% according to modification of rating system of Green and O Brien at then end of a follow up period of 38 months.

Hegerman et al[61] study on 16 patients with unstable intra articular distal radius fracture with neglect showed that post closed reduction and external fixation; functional outcome was excellent to good in 10 patients, fair in 2 patients and poor in 4 patients who had a complication of reflex sympathetic dystrophy.

Kreder et al[62] conducted a randomized controlled trial among 179 patients of displaced intra articular fracture distal radius. They were randomized to receive different form of treatments. First group of 88 patients underwent indirect percutaneous reduction and external fixation and the second group of 91 patients underwent open reduction and internal fixation. After a follow up period of 2 years the first group had more rapid return of functional capacity and better functional outcome. Upper limb musculoskeletal function assessment score, SF-36 bodily pain sub scale score, overall Jensen score, Pinch strength and Grip strength assessed them all.

Elmi et al[63]conducted a study on 14 patients with intra articular distal radius malunion neglected for 2 years. They were treated by open wedge osteotomy with dorsal plate and cancellous bone graft. After a follow up of 2 years significant improvement with satisfactory results were seen in the patients.

Neglected transscaphoid perilunate fracture dislocation

This is a rare injury and is easily mis-treated. Post neglect they need extensive dissection process for reduction and proximal row carpectomy. They do not usually have a good outcome.

Garg et al[64] studied 16 cases of neglected transscaphoidperilunate fracture dislocation. They all had a mean period of neglect of 4.5 months. The authors performed a new procedure of staged reduction followed by surgical procedure with Herbert screw and Kirschner wire fixation. The outcome was excellent in 9 cases, good in 5 cases and fair in 2 cases who developed reflex sympathetic dystrophy.

Lal et al[65] presented a case report of a 3 month old volar transscaphoid transcapitate perilunate fracture dislocation. The procedure was two staged surgical intervention. Post 3 years of follow up the paints enjoyed pain free full range of supination, pronation and radius and ulna deviation. The patient had a 10° dorsiflexion deficit.

LOWER EXTREMITY

Neglected injuries involving Hip joint

Fractures involving the hip joint are considered as serious injuries. In Indians there is a necessity for squatting or cross-legged sitting so there is a need for the preservation of Biological Hip joint. Traumatic

dislocation of hip is truly an orthopedic emergency. Failure to recognize and treat it early leads to significant poor prognosis.

Clinical findings and complications

After hip dislocation the most common long-term complication is posttraumatic arthritis, even a small amount of strain has a harmful effect on articular cartilage. Uppadhyay reported 16% incidence of posttraumatic arthritis[66] in his study conducted on 74 patients with simple hip dislocation. In fracture neck of femur when it is intracapsular hemorrhage which has occurred into the joint as a result of injury to the blood vessels running along the neck of femur especially anterior and intra medullary vessels remains fluid for 2 weeks and after that gets absorbed and is not part of callus formation.

Old unreduced dislocations of hip are relatively uncommon in adults. It may go unrecognized in a few poly trauma cases with head injury and fracture dislocation of the contralateral hip. Chronic old posterior dislocation has a poor prognosis in Epstein's Type 4 and 5 where a primary reconstructive procedure gives best results. The most common complications seen are adhesion and contracture of soft tissue, myositis ossificans, and fibrous tissue filling up in acetabular cavity. Total hip replacements are also done in type 4 and 5 Epstein's when it is dislocated for more than 3 months.

Neck of femur fractures on neglect present with partial/total absorption of femoral neck, osteonecrosis is seen in 8-30% of cases, and upward migration of trochanter. In adults the incidence of non-union neck of femur fractures is 2-3%. Causes of neglect in neck of femur fractures are poverty, lack of facilities, ignorance, and faith in traditional healers. Prosthetic treatment is the preferred treatment; whereas in a study revision fixation alone for non-union neck of femur fractures achieved 100% union in selected cases with shortening less than 1.5cm. In 10-20% cases the reason for non-union is biomechanical.

Functional range of motion[67]

Hip rotation range of motion in supine and hip extension was 68.1◦ with external rotation= 38.5°and internal rotation= 29.6°;

In prone position with hip extension was 77.1°, external rotation = 41.8° and internal rotation = 35.2°;

In sitting position with hip flexed the range of motion was 78.5° external rotation = 78.5° and internal rotation = 37.9°

Outcome analysis of neglected hip dislocation

Gupta RC[68] et al conducted a study on 7 patients with old isolated posterior dislocation of hip. Up to 9 months of neglected dislocation cases were included in this study. They devised a special technique for reducing the hip joint by applying 7 to 18 kg of traction under sedation for 5 to 17

days that resulted in over reduction of the hip joint. Followed by gradual reduction of traction and limb abduction, the femoral head was reduced to reposition it into acetabulum. The results were good to excellent, during a follow up period ranging from 6 months to 3 years. Out of the 7 patients, 6 patients had no complications of avascular necrosis or osteoarthritis but in one patient with duration of neglect of 9 months with associated acetabulum comminuted fracture and pelvis fracture the method failed.

Garret et al[69] reported 39 cases of traumatic unreduced posterior dislocation of hip with period of neglect ranging from 3 days to 9 years. Out of these cases 3 were treated by closed and open reduction showed good outcome, 10 cases treated with primary reconstructive procedure also showed good prognosis whereas 6 unreduced cases showed poor prognosis.

Oni et al[70] conducted a study among 11 patients with unreduced hip dislocation of duration 3 weeks to 6 months. They treated them by applying continuous skeletal traction of 10-30 kg and showed excellent to acceptable results.

Varma BP[71] studied 29 cases of unreduced neglected hip dislocation of duration of neglect ranging from 2 weeks to 6 years. Out of the 29 cases 11 were adults. Surgical procedure was performed in 7 adults and they showed excellent outcome in 4 cases, good outcome in 2 and fair in one case.

Kim YH[72] et al studied 7 patients with untreated comminuted unstable inter trochanteric fracture of femur associated with posterior dislocation of femoral head that were treated with cement less porous coated hemi arthroplasty. After follow up range of 23 to 60 months the outcome was excellent to good in these cases.

Kanna et al[73] studied 8 cases of nonunion trochanteric fractures with capsular interposition with cases having history of treatment by indigenous methods for 2 to 3 months. They were treated with open reduction and internal fixation with dynamic hip screw or dynamic condylar screw with bone grafting (in 5 cases). The patients were followed up for 5 months up to 1 year and the outcome seen was union of fracture in 6 cases, one case showed persistent nonunion and one case could not be followed up.

Outcome analysis of neglected neck of femur fractures

Magu NK et al[74] studied 55 patients with average duration of neglect of 12 weeks he treated them with Muller's modification of intertrochanteric osteotomy, a follow up of 48 cases upto 2 years showed 40 cases with good to excellent results and 8 with fair outcome using Harris hip score.

Lin et al[75] study on 20 patients with neglected neck of femur fracture for a period of 6-16 weeks for whom Dynamic hip screw with

autogenous bone BMP-2 composite material grafting. The patients were assessed with Harris Hip score, which showed 14 with excellent results, 2 with good, 1 with moderate and 3 with poor results.

Kainth et al[76] study of 22 patients with more than 3 week old neglected neck of femur fracture, assessed their bone quality with Singh's index and treated them surgically with closed reduction and internal fixation. He followed them up for 6 months, which showed excellent outcome in 2, good in 17 and poor in 3 (Askin and Bryan criteria).

Kapoor et al[77] conducted a study among 23 patients with fracture and nonunion neck of femur with duration of neglect of more than 1 month. They were treated with a special 3 in 1 surgical technique, which included osteosynthesis with DHS, non-vascular fibular graft placing and valgus osteotomy. The cases were followed up for 2 to 13 years and 18 patients had excellent to good outcome.

Huang et al[78] studied 16 patients diagnosed with neglected fracture neck of femur of duration ranging from 3 months to 2 years. They all were treated with skeletal traction and closed or open reduction and were followed up for 2 to 8 years. 13 patients showed good to excellent outcome. (Askin and Bryan criteria)

Kalra et al[79] studied 20 cases of displaced fracture neck of femur with neglect duration of more than 1 month. They all underwent valgus

intertrochanteric osteotomy. Post 30 months of follow up the cases all showed good to excellent outcome. (Askin and Bryan criteria)

These studies have shown the efficiency of open reduction and adjuvant procedures in bringing out the expected outcome in patients with isolated Hip dislocation as well as associated neck of femur fracture and in a rare case of trochanteric fracture with joint capsule involvement.

Neglected injuries involving knee joint:

Neglected knee injuries are relatively rare as this is an important weight bearing joint. The injuries involving the knee joint include isolated dislocations, distal femur fractures, fracture of patella and fracture of proximal tibia. Out of the dislocations 40% are anterior, 33% posterior and 5% rotatory mechanism[80].

Clinical findings and complications

The most common findings synonymous with neglected knee injuries are extensive ligament disruption and contracture, infection, heterotopic ossification, chondrolysis of unreduced knee cartilage, stiffness, deformities, discrepancy in limb length and osteopenia[81].

These complications have to be treated in a stepwise pattern to restore near normal anatomy and functional capacity as this is an important joint to ensure good quality of life.

The goals of treatment in case of neglected knee injuries are:

- Reconstruction of articular surface
- Re-establishment of tibial alignment

Treatment usually involves:

- Reduction and buttress plating of disrupted articular segments by grafting with bone.
- Soft tissue reconstruction including menisci and ligaments.
- Spanning external fixator as a temporary measure in patients with high energy injuries or significant soft tissue injury
- Arthroscopy

Functional range of motion

Flexion 0°-90° is acceptable[82] and in some cases flexion of 5^0-$120^{083}$is found to give satisfactory functional life for the patients.

Outcome analysis

As these injuries getting neglected is a very rare phenomena, literature search has provided with only case report studies. Some of the case report discussions and their outcome are described below.

Khamaisy et al[82] studied a case of neglected rotatory tibio-femoral dislocation associated with lateral patella dislocation of 3 years duration of neglect. The patient underwent multiple procedures including Ilizarov,

and tibial tubercle osteotomy. Post a 9 year follow up period the patient showed good outcome.

Henshaw et al[84] studied a case of unreduced posterior dislocation of 24 weeks neglect duration. The procedure done was open reduction and internal fixation. After a follow up period of 22 weeks the patient had satisfactory result.

Mathai et al[85] studied a case of unreduced anterior dislocation of knee with common peroneal nerve palsy. The procedure done was arthrodesis with Dynamic compression plating. The patient was followed up for 2 years. Modified knee society score of 65 out of 75(25 points for ROM was not taken into account) was seen at the end of 2 years.

Karn et al[86] studied a case of anterior dislocation with neglect duration 4 weeks. The patient underwent open reduction and internal fixation. After a period of 1 year follow up the outcome was satisfactory with range of motion of 5°-70° attained.

Guillen et al[87] studied a case of knee injury with bayonet deformity, secondary equinus deformity of foot with peroneal nerve palsy neglected for 50 years post disease at 5 years of age. The patient had sustained systematic treatment for her deformity correction that included external fixator application, progressive reduction and arthrodesis. After a 1 year follow up period the patient had slight limitation of everyday activities but enjoyed a great deal of subjective satisfaction.

Raj et al[88] studied a case of 8 months old neglected intra articular proximal tibia fracture and post-surgical reduction and at the end of 1 year the patient showed good functional outcome.

Saini et al[80] studied a case of 3 month old neglected irreducible posterolateral knee dislocation. The procedure done was open reduction and PCL reconstruction and other adjuvant procedure based on intra operative findings. The patient was followed up for 3 years and Knee society clinical and functional Knee scores were 88 and 90 respectively.

Chen et al[89] studied a case of unreduced posterior dislocation with advanced osteoarthritic changes with duration of neglect of 30 years. This patient underwent multiple stepwise procedures and at the end of 2 years had good outcome.

Devgan et al[90] conducted a case series study of 3 patients with old medial tibial plateau fracture with non-union. They were treated by a minimally invasive technique of high tibial osteotomy and realignment procedure. With physiotherapy and exercises the cases achieved union and satisfactory results.

Anand et al[83] studied 12 cases of malunion of intra articular tibial plateau fracture with duration of neglect ranging from 3 to 12 months. The procedures performed were patient tailored; they ranged from corrective osteotomy to reconstruction surgeries fixative surgeries and also bone grafting. After a mean follow up of 54 months the patients were

evaluated using Lysolm scoring system and the reports were excellent in 5 cases, good in 5 cases, and fair in 2 cases.

Jiang et al[91] studied a 27 years old nonunion Hoffa fracture and incongruence of medial condyle. Open surgical procedure with internal reduction and deformity correction with xenograft bone graft and screw fixation for fracture fixation was done. After 1 year follow up patient showed satisfactory results with full weight bearing and no instability with ROM 0°-125°.

Thus these studies have proven that, irrespective of the duration of neglect, by stepwise patient tailored procedures and careful follow up satisfactory functional restoration is possible for neglected injuries involving knee joint.

Neglected injuries involving ankle joint:

One of the most commonly neglected fractures is ankle fracture, and they are one of the most quality of life affecting neglected injuries. The causes for neglect are: missed diagnosis, wrongly diagnosed by quacks, improperly reduced - as even few millimeter differences in positioning of talus under tibia leads to rapid post traumatic arthritis[92].

Clinical findings and complications

Clinically the patient may present with pain and swelling around the ankle with complaints of increased pain during walking on uneven

surfaces and on full weight bearing. This may also cause altered body kinematics affecting other joints like knee, back (ipsilateral).

Radiologically- malunion is most commonly seen. Talar tilt would be present; posttraumatic arthritic changes may be present.

Treatment methodology-

Depends on the age, functional outcome requirement, deformity, and duration of neglect, range of movement at presentation and arthritic changes of the patient.

If the duration of neglect is more than 3 months the displaced talus causes degeneration of articular cartilage and the outcome is poor after surgery.

Surgical management:

- Osteotomy of fractured fibula or medial malleolus or bothwith restoration of fibular length.
- Internal fixation of osteotomies.
- Supramalleolar dome osteotomy is done,
- Tibio fibular diastasis must be corrected.
- Ankle arthrodesis is a last option.

Osteotomies of the medial and lateral malleoli restore weight-bearing alignment, but pain and swelling may persist if arthritic changes are present. In these cases the preferred surgical management is Dome osteotomy where the leg length is maintained during deformity correction

and it permits multi-axial deformity correction. Poor results are associated with delayed reconstruction in cases beyond 3 months of neglect, presence of osteochondral defect or arthritic change and displacement or residual talar tilt.

Ankle arthrodesis is done in cases of

- Extensive arthritic changes seen
- Old unreduced talar dislocation

Instead of extensive corrective surgery, especially in our set up in cases of manual laborers ankle arthrodesis can be an option to attain stable, pain free ankle in a single procedure.

Functional range of motion[93]

Ankle joint exhibits the following functions:

Flexion – plantar flexion

Extension- dorsi flexion

Functional range of motion is small in ankle joint i.e. 10°- 15° flexion about the neutral position of ankle.

Full range of flexion is 23° and extension is 21°.

During weight bearing normal ankle extends till 10° to 25° and flexes till 15° to 31°.

Outcome analysis

Ankle joint being an important joint for weight bearing and to have quality functional life the neglect of it though rare still is prevalent due to various causes. They have to be treated in a manner to structurally restore them to gain fruitful daily activities.

Mostafa et al[94] conducted a study among 16 patients in whom ankle injuries were neglected due to varying reasons for an average of 2.2 months. They were all diagnosed with neglected ankle fracture dislocation and they underwent surgical procedures to restore the length and alignment of ankle joint. After a follow up period of more than 3 months 10 cases had excellent to good outcome and 6 had fair to poor outcome.

Tellisi et al[95] in a study of fracture dislocation of ankle which were approximately 6 weeks old the cases had posterior translation, external rotation of talus, displaced posterior malleolar fragment, distal fibular fracture. The patients were treated by open surgery and Taylor special frame. Follow up for 2 years gave a good result. The patients were mobile with mild pain.

Khan et al[96] in study of neglected Weber type B fracture fibula with posterolateral subluxation of ankle were treated with open reduction and plating for fibula. 1 year follow up showed satisfactory results with full range of motion.

Saied et al[97] studied a case of 10 month old anterior tibiotalar dislocation. The procedure done was open reduction, but proper reduction was not possible inspite of multiple attempts. Hence the patient did not have a good outcome.

Goyal et al[98] conducted a study in a case of compound trimalleolar fracture with subluxation. The duration of neglect was 1 year. The procedure done was tibiotalar arthrodesis and bone grafting. AOFAS scoring showed satisfactory results at the end of follow up period.

Chiu et al[99] conducted a study among 13 cases of neglected ankle fracture of 2-36 months neglect duration. They all were surgically treated and followed up for a period of 5 to 15 years. At the end of last follow up good results were seen in cases which had duration of neglect within 6 months only.

Chueng et al[100] conducted a study among 49 cases of neglected ankle fracture dislocations. They had an average period of neglect of 17.6 months. The procedures done were various depending on patient's needs included open reduction and arthrotomy. Post a mean period of 3 years follow up the cases had good outcome.

In ankle joint involvement the literature review has stressed the importance of duration of neglect as an important factor determining the outcome. Other than that another very important aspect for good

functional outcome is the achievement of good reduction and realignment of the structures in ankle joint.

Thus so far the literature review has shown that for each joint there is a separate pathology involved and in case of neglected joint injuries the treatment is not always set in stone. The procedure has to be tailored step wise to bring about near normal realignment, reduction, and restoration of functional capacity. For each joint the treatment offered and its outcome varies based on external factors and internal factors.

The external factors include age of patient, gender, cause of neglect, duration of neglect, associated co morbidities, joint involved and functional capacity required.

The internal factors include the intra operative findings of soft tissue destruction, osteoarthritis, capacity to realign and reposition, near normal reduction possibility and associated neurovascular complications.

MATERIALS AND METHODS

MATERIALS AND METHODS

This study, which is a prospective and retrospective study, was conducted after getting approval from Institutional Ethical Committee. This study was conducted during the period of January 2015 to December 2015.

615 patients from Institute of Orthopedics & Traumatology Rajiv Gandhi Government General Hospital, Chennai were selected based on set criteria. All patients were selected after getting informed consent.

The criterion for their selection was based on the following:

- All patients with periarticular fractures, fracture dislocations and isolated dislocations of major joints

Upper extremity

- Shoulder
- Elbow
- Wrist

Lower extremity

- Hip
- Knee
- Ankle

Based on the number of patients, the sample proportion of neglected periarticular fractures, fracture dislocations and isolated dislocations was calculated.

Proportion= p = number of neglected cases
Sample size

Then this formula was applied respectively to each group to find the proportion among

- Different age groups
- Gender
- Urban and rural area of residence
- Difference according to mode of injury –Road traffic accidents, work place injuries and injuries at home.
- Difference according to cause for preferring native treatment:
    1. Monetary reasons
    2. Cultural and social belief system
    3. Accessibility
    4. Fear of surgical methods and its complications.
- Difference among different forms of native treatment
    1. Massage
    2. Splint with sticks
    3. Forceful manipulation
- Extremity wise sample proportion
- Joint wise sample proportion

Criteria for selection of neglected cases:

- **Age 14- 60 years**

  According to the policy of Indian Academy of pediatrics children up to 13 years are treated by pediatric specialists and for more than 14 years they are treated as miniature adults in general hospital. The age limit for geriatric population starts from 65 years. As the orthopedic management of these extremes is incomparable we have chosen to take the median group for our study.

- **Both gender**

- **Injury to intervention interval – 1 Week**

  As patients from remote areas with poor accessibility, despite being aware of the need for an orthopedic specialized care for their injury, the time for them to reach the center highly varies. Hence we have set an inclusive period of 1 week and more as neglected period from previous experience and hospital data.

- **History of neglect of injury due to various reasons**

  They were evaluated based on:

History of patient annexure:

To include detailed history on nature and cause for injury, orthopedic complaints immediately post injury and at present, treatment opted if any and detailed study about the modality of treatment and

outcome of previous treatment, duration of neglect, urban or rural nativity, occupation and its nature whether heavy moderate or light and associated co morbid conditions.

Questionnaire

A screening questionnaire was devised to acquire a detailed knowledge about the cause for neglect and the reasons behind it and also to examine the interlinked relationships between these causative factors. The questionnaire it also included the details about reason for opting for tertiary care now and the outcome that the patient expects.

Clinical examination

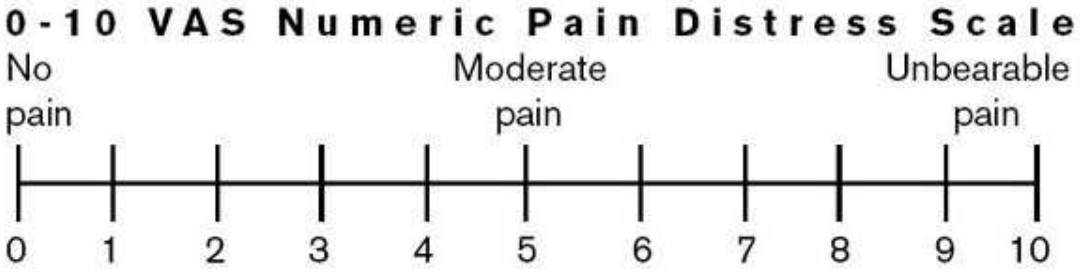
On presentation the patient's full clinical examination was done according to proforma specific to each case based on the joint involved. Details of the limb on inspection, palpation and range of movement possible and neurological examination were noted.

Visual analog scale

Visual analog scale is a system of psychometric scale based on patient response for analysis of pain. The reliability is widely tested and it is proven to be able to determine acute as well as chronic pain.

The scale was in the form of a 100mm line with markings from 0 to 10 at regular intervals of 10mm. The two extremes were marked as - minimum pain at 0 and maximum pain at 10.

The patients with altered mental status and diminished visual acuity were excluded. Then they were asked to point in the scale the level of pain due to their neglected injury. This evaluation was done pre and post procedure and then compared to find the difference.



Functional evaluation

- Moderately to poorly affected daily activity, household activity, and work place activity

Radiological evaluation

- **Digital X ray**
- Digital Xray was taken in antero-posterior and lateral views and special views for specific cases as needed. They showed the alignment of the limb, articular surfaces, soft tissue shadows, Myositis ossificans, radiological, callus and deformity, if present is noted. Opposite limb normal Xray was taken in Anatomical

position and the degree of deformity was noted in template for correction of affected limb.

- **MRI Scan**

MRI scan were taken for specific case which includes fracture neck of femur, fracture neck of humerus in order assess the vascularity and viability of the head of long bones involved in the fracture

Intervention:

The intervention mode planned for the patients were based on

Age

Limb involved

Functional needs

Follow up treatment protocol

General postoperative protocol followed was:

- Patient customized
- Parenteral Antibiotics therapy were given for 5 days to 1 week
- Indomethacin was started in all the cases on 1st postoperative day and was continued for 2 weeks.

The joint specific protocol followed is as follows:

POST FOLLOW UP FUNCTIONAL EVALUATION

All patients were further evaluated at the end of last follow up with pre-validated, specific, functional evaluation scoring system. They are as follows:

- Shoulder joint- Rowe and Zarin score
- Elbow joint - Mayo elbow score
- Wrist joint- Modified Mayo wrist score
- Hip joint- Harris hip score
- Knee joint- Bostman knee score
- Ankle joint- Karlsson and Peterson Scoring system

SHOULDER JOINT

11 cases were diagnosed as neglected shoulder injuries between January 2015 and December 2015 in our hospital. Out of which 5 cases were isolated dislocations, 2 were periarticular fractures and 4 were fracture dislocations.

Pre-interventional stage:

The duration of neglect ranged from 1 week to 24 weeks, and the mean was 6.36. All the 11 patients had undergone native treatment in the form of manipulation and massaging. All the patients were clinically

examined, their range of movements measured and a thorough neurological evaluation was done. Radiological evaluation was done to assess the associated fractures and defects in articular surface if present. CT scan was done to confirm the skeletal injuries and to determine their full extent to plan for surgery. Physical therapy for strengthening of the muscles of the involved limb was started on day one of the patient's consultation.One of our case was a known case of seizure disorder, who had is shoulder dislocated due to a fall during a seizure episode. He was pre-operatively evaluated by the Neurologist, he was under sufficient anti-epileptic cover. The limitation of functional range of motion(based on the University of Pennsylvania) and the pain associated were our main indication for intervention.

Interventional stage

The following Table 1 gives the details of diagnosis and procedure done for these patients.

Table 1: Diagnosis and procedure done for neglected injuries involving shoulder joints

Case.No.	Diagnosis / duration of neglect	Procedure done
1S	Right shoulder dislocation / 12 weeks	Open reduction and humeroglenoid K wire fixation
2S	Anterior dislocation left shoulder / 1 week	Closed reduction under GA
3S	Anterior dislocation left shoulder / 1 week	Closed reduction under GA
4S	Dislocation right shoulder with greater tuberosity fracture / 2 weeks	Open reduction with capsulolabral repair
5S	Surgical neck of humerus fracture / 1 week	Open reduction internal fixation with proximal humerus locking plate
6S	Greater tuberosity fracture right side / 2 weeks	Immobilization with 'U' slab
7S	Anterior dislocation of right shoulder with greater tuberosity fracture / 12 weeks	Open reduction internal fixation with corocoid osteotomy and K wire fixation.
8S	Anterior dislocation right shoulder / 4 weeks	Open reduction and humeroglenoid K wire fixation
9S	Greater tuberosity fracture right humerus / 24 weeks	Conservative with cuff and collar support and physical therapy
10S	Post traumatic stiffness right shoulder with greater tuberosity fracture / 10 weeks	Shoulder mobilization exercise
11S	Anterior dislocation left shoulder / 1 week	Open reduction and internal fixation with humeroglenoid K wire and Latarjet procedure

In our series, cases 1S, 2S, 3S, 4S, 7S, 8S and 11s were chronic shoulder dislocations in which closed, gentle manipulation under anaesthesia was tried in all the cases. Cases 2S and 3S were successfully reduced by closed manipulation, whereas the remaining cases required open reduction with or without adjuvant procedures. A deltopectoral approach was used in all the cases The adjuvant procedures used were meticulous capsulo-labral repair in all the cases and Latarjet procedure in case 11s as there was a large engaging Hill Sachs lesion in that case. In all the cases which were open reduced, humeroglenoid K wire transfixation was done.

Post-intervention stage

For case 1S,8S,10S – the K wires were removed at a period of 2 weeks as a standard protocol with continued immobilization. Intermittent, gentle, pendulum exercises was started after 3 weeks for all the cases.

For case 5S alone - 6 weeks of immobilization and passive range of motion exercise was started at 3 weeks as tolerated.

Rowe and Zarin score was used to evaluate the patients with neglected injuries involving shoulder joint after the recommended procedure specific for the particular patient was done.

Table 2: Rowe and Zarin scoring system

Parameter	Score
Functional capacity:	
No or slight limitation in play/ work	50
Moderate limitation of overhead work/ play	35
Marked limitation in play/ work	20
Unable to work overhead	0
Pain:	
None	10
Moderate	5
Severe	0
Stability:	
Apprehension rest- negative No subluxation	30
Apprehension test –negative Arm in abduction and external rotation-mild discomfort	15
Apprehension test- positive Sense of subluxation-present	0
Range of motion:	
Full	10
Upto 25% loss in any plane	5
> 25% loss of motion	0

Table 3: Grading system for Rowe and Zarin Score

Grade	Score
Excellent	90-100
Good	70-89
Fair	40-69
Poor	< 39

ELBOW JOINT:

16 cases of neglected injuries involving elbow joint were seen during the study period. Of which 4 were isolated dislocations of elbow, 1 was dislocation with associated fracture and the rest 11 cases were fractures involving elbow joint.

Pre-intervention stage

The duration of neglect in elbow injuries ranged from 2 weeks to 48 weeks. All the 11 patients had undergone native treatment in the form of manipulation and massaging.In 1 case the elbow was immobilized in extension resulting in stiffness in an extended attitude. All the patients were clinically examined, their range of movements measured, the mean arc of elbow flexion in our series was 60º and the mean arc of forearm rotation was 45º. Both were less than the Morrey's criteria (100º each for flexion and extension) of functional range of motion at elbow. A thorough neurological evaluation was done. Radiological evaluation was done. Physical therapy for strengthening of the muscles of the involved limb was started on day one of the patient's consultation**.**

Intervention stage:

For cases of neglected elbow dislocation posterior midline approach was used,and Boyd approach was used for neglected Monteggia fractures. Extensive capsular release, Bhattacharya's arthrolysis and

triceps release was done in all cases of neglected elbow dislocations. After reduction transhumeral fixation with 2−3, 2.5 mm K- wires in two cases and just immobilization with posterior plaster slab in two cases of neglected elbow dislocations was done. Adjuvant procedures likelengthening of triceps aponeurosis, debridement and synovectomy, manipulation under anaesthesia and radial head excision

Table 4: Diagnosis and procedure done for neglected injuries involving elbow joint.

Case No.	Diagnosis / duration of neglect	Procedure done
1E	Posterior dislocation Left elbow / 12 weeks	Triceps V-Y plasty Open reduction and ulnohumeral K wire fixation
2E	Posterior dislocation left elbow / 10 weeks	Open reduction and ulno humeral and radio capitellar K wire fixation
3E	Supracondylar fracture humerus left side / 24 weeks	Triceps V-Y plasty Open reduction and internal fixation with Bicolumn plating
4E	Supracondylar fracture humerus right side / 32 weeks	Triceps V-Y plasty Open reduction and internal fixation with Bicolumn plating
5E	Lateral condyle humerus left side / 12 weeks	Open reduction and internal fixation with Buttress plate.
6E	Distal humerus fracture right side with intercondylar extension / 16 weeks	Chevron osteotomy for olecranon. Open reduction and internal fixation with Bicolumn plating

7E	Posterior dislocation of left elbow with medial epicondyle fracture / 4 weeks	Triceps V-Y plasty Open reduction of elbow joint and screw fixation for medial malleolus and Ulnar nerve neurolysis and anterior transposition
8E	Supracondylar fracture humerus left side / 48 weeks	Open reduction and internal fixation with lateral column plate and screw for medial condylar fragment.
9E	Posterior dislocation of left elbow / 3 weeks	Closed reduction and percutaneous ulnohumeral K wire
10E	Fracture radial head left side / 40 weeks	Radial head excision
11E	Proximal ulna fracture with radial head dislocation / 16 weeks	Radial head excision open reduction and internal fixation with Recon plating for ulna
12E	Lateral condyle fracture humerus with tardy ulnar nerve palsy right side / 15 weeks	Open reduction and internal fixation of lateral condyle with screw and anterior transposition of ulnar nerve
13E	Lateral condyle fracture nonunion with radial head fracture / 8 weeks	Open reduction and internal fixation of lateral condyle with screw and anterior transposition of ulnar nerve
14E	Right posterior dislocation of elbow / 12 weeks	Open reduction with internal fixation with Ulnohumeral K wire.
15E	Olecranon fracture / 2 weeks	Modified tension band wiring with bone grafting
16E	Terrible triad of elbow right side / 3 weeks	Open reduction Herbert screw fixation for radial head fracture and transosseous coronoid fracture repair with fiber wire sutures.

Post- intervention stage:

Cases 1E, 2E, 9E and 14E were given soft posterior slab immediately after the procedure which was continued for 10 days. The K-wires were removed after 21−28 days after which gradual mobilization of the joint was done, passive followed by active, but no weight lifting was allowed. At 6 weeks light stretching exercises and at 3 months continuous passive full stretching exercises were started. In case 7E the same protocol was followed but the immobilization period was for 14 days due to pin loosening on 5^{th} post op day due to infection.

In cases 3E, 4E, 6E and 8E elbow mobilization was started at the end of 1 week. For the rest of the cases mobilization was begun as early as tolerated after ensuring joint stability intra operatively.

Mayo elbow score was used to evaluate the patients with neglected injuries involving elbow joint after the recommended procedure specific for the particular patient was done.

Table 5: Functional evaluation score for elbow joint

Mayo elbow score

FUNCTION	POINT SCORE
Pain (45 points)-none	45
-mild	30
-moderate	15
- severe	0
Motion(20 points)-Arc 100 degrees	20
-Arc 50-100 degrees	15
-Arc 2 degrees	5
Stability (10 points)- stable	10
-Gross instability	0
Daily function(25 points)	
- combing hair	5
-feeding oneself	5
-Hygiene	5
-putting on shirt	5
-putting on shoes	5
Maximum possible	**100**
Excellent	>90
Good	75-89
Fair	60-74
Poor	< 60

WRIST JOINT

7 cases of neglected injuries involving wrist joint were admitted during our study period.

Pre-intervention stage:

In our series of 7 cases of neglected wrist injuries, the duration of neglect ranged from 1 week to 18 weeks. All the patients presented with pain and restricted movement at the wrist joint. Among the 7 cases, 5 had involvement of the dominant limb, which caused severe impairment in their activities of daily living. Radiological examination of the wrist joint was done in antero-posterior, lateral, ulnar oblique and radial oblique views. The proximal and distal rows of carpal bones were assessed using the oval ring theory. The distal radio-ulnar joint stability was assessed. In fracture of scaphoid CT and MRI scans were taken to assess its viability.

Intervention stage:

In all the cases except in scaphoid fracture fixation volar approach was used and the implants used for Herbert screw and K wires. For scaphoid fracture dorsal approach and standard Russe bone graft and scapholunate K wire fixation was done.

Table 6: Diagnosis and procedure done for neglected injuries involving wrist joint

Case no.	Diagnosis / duration of neglect	Procedure done
1W	Fracture nonunion scaphoid with perilunate dislocation left side / 18 weeks	Open reduction and Herbert screw fixation with iliac bone graft for scaphoid fracture and scapholunate K wire fixation
2W	Left distal radius fracture right side / 12 weeks	Darrach's procedure
3W	Distal radius and ulna styloid fracture right side / 1 week	Open reduction and internal fixation with volar locking plate for radius and radioulnar K wire transfixation
4W	Volar Barton fracture right wrist / 1 week	Open reduction and internal fixation with volar locking plate and bone grafting was done
5W	Distal both bone fracture with distal radio ulnar joint disruption right side / 7 weeks	Open reduction and internal fixation with volar locking plate with K wire fixation for distal ulnar fracture
6W	Right Galleazi fracture right side/ 8 weeks	Open reduction and internal fixation with Asian dynamic compression plate
7W	Right Galleazi fracture right side / 2 weeks	Open reduction and internal fixation with Asian dynamic compression plate and radio ulnar K wire fixation

Post-intervention stage:

In case 1W, K-wire was removed post an interval period of 3 months and intermittent mobilization exercises were started. In case 4 mobilization exercises were initiated after 1 week. In case 5 long arm cast was applied and removed after 6 weeks followed by K-wire removal and ulnar gutter splint was advocated to the patient for another 1 month. Mild activities were encouraged after 4 months. In case 2W active exercises were initiated on the immediate post-operative day. Cases 6W and 7W, K-wire removal was done after 6 weeks.

Mayo score was used to evaluate the patients with neglected injuries involving elbow joint after the recommended procedure specific for the particular patient was done.

Table 7: Modified Mayo wrist score

Parameter	Score
Pain – No pain	25
Mild occasional	20
Moderate	15
Severe	0
Work status Regular job	25
Restricted job	20
Able to work but unemployed	15
Unable to work due to pain	0
Range of motion >120°	25
100°-119°	20
90°-99°	15
60°-89°	10
30°-59°	5
0°-29°	0
Grip strength (% of normal) 90-100	25
75-89	15
50-74	10
25-49	5
0-24	0

Table 8: Grading system for modified Mayo wrist score

Grade	Score
Excellent	90-100
Good	80-90
Satisfactory	60-80
Poor	<60

HIP JOINT

Totally 96 cases were admitted with neglected injuries involving hip joint in our hospital. Of which 67 cases were natively treated and 29 cases reported without any treatment. The 29 cases which had presented without any treatment included 19 cases from rural areas with poor accessibility to orthopedic specialty hospital and 10 cases with lack of proper care givers.

Pre-intervention stage:

The patient presented to our hospital with a range of period of neglect of 1 week to 144 weeks. The patients presented with pain and moderate to severe restrictions of activities of daily living. In young individuals the procedure was done as soon as possible where as in patients with associated comorbidities complete medical evaluation was done and then taken up for surgery. Radiological examination was done in all the cases which constituted pelvis and both hip X-ray in traction

and internal rotation view. The remnant neck present was assessed for neck of femur cases and MRI was done to assess the vascular viability in cases with duration of neglect more than 10 days for whom fixation was planned.

Intervention stage:

The procedure for the patients were done based on age, duration of neglect, bone stock and associated comorbidities

Among the 31 intertrochanteric fractures cases 24 cases had undergone dynamic hip screw fixation and among them 8 cases had needed bone grafting. And in remaining 7 cases, 4 cases had proximal femoral nailing done and 3 cases which had subtrochanteric extension Dynamic condylar screw fixation was done with bone grafting.

Among the 3 cases with neglected dislocation of hip, 1 case which had associated protrusio acetabuli Total hip replacement with anti-protrusion cage was done, for the second case Girdlestone arthroplasty was done and in the third case Steinmann pin transfixation from greater trochanter to acetabulum. 56 cases had neck of femur fractures, out of them total hip replacement was done in 15 cases, bipolar hemiarthroplasty was done in 16 cases, valgus osteotomy and dynamic hip screw fixation was done in 2 cases, cancellous screw fixation was done in 22 cases.

Table 9: Diagnosis and procedure done for neglected injuries involving Hip joints

Case no.	Duration of neglect	Diagnosis of the cases	Procedure done
1. H	1 week	Greater trochanteric fracture right femur	Open reduction and internal fixation with tension band wiring
2. H	8 weeks	Neckof femur fracture right side	Dynamic hip screw fixation with valgus osteotomy
3. H	4 weeks	Intertrochanteric fracture right femur	Open reduction and internal fixation with Dynamic hip screw fixation with bone grafting
4. H	20 weeks	Neck of femur fracture right side	Bipolar hemiarthroplasty
5. H	12 weeks	Neck of femur fracture right side	Total hip replacement
6. H	2 weeks	Left side intertrochanteric fracture femur	Open reduction and internal fixation with Dynamic hip screw fixation with bone grafting
7. H	3 weeks	Left side intertrochanteric fracture femur	Dynamic hip screw fixation
8. H	4 weeks	Neck of femur fracture right side	Bipolar hemiarthroplasty
9. H	20 weeks	Nonunion neck of femur fracture left side	Total hip replacement

10.H	3 weeks	Left side Intertrochanteric fracture femur	Dynamic hip screw fixation
11.H	2 weeks	Left side intertrochanteric fracture femur	Dynamic hip screw fixation
12.H	1 week	Intertrochanteric fracture left femur	Dynamic hip screw fixation
13.H	1 week	Neck of femur fracture left side	Bipolar hemiarthroplasty
14.H	12 weeks	Neck of femur fracture left side	Total hip replacement
15.H	1 week	Neck of femur fracture right side	Bipolar hemiarthroplasty
16.H	1 week	Neck of femur fracture right side	Cancellous screw fixation
17.H	1 week	Neck of femur fracture right side	Cancellous screw fixation
18.H	2 weeks	Intertrochanteric fracture femur right side	Dynamic hip screw fixation
19.H	1 week	Neck of femur fracture right side	Cancellous screw fixation
20.H	12 weeks	Left side intertrochanteric fracture femur	Open reduction and internal fixation with dynamic hip screw and bone grafting
21.H	2 weeks	Left side intertrochanteric fracture femur	Dynamic hip screw fixation

22.H	1 week	Cervicotrochanteric fracture femur left side	Dynamic hip screw fixation
23.H	2 weeks	Neck of femur fracture right side	Cancellous screw fixation
24.H	3 weeks	Neck of femur fracture right side	Total hip replacement
25.H	12 weeks	Neck of femur fracture left side	Total hip replacement
26.H	8 weeks	Neck of femur fracture left side	Bipolar hemiarthroplasty
27.H	1 week	Neck of femur fracture left side	Cancellous screw fixation
28.H	1 week	Left side intertrochanteric fracture femur	Dynamic hip screw fixation
29.H	1 week	Neck of femur fracture left side	Dynamic hip screw fixation with valgus osteotomy
30.H	12 weeks	Malunited intertrochanteric fracture femur right side	Conservative, planned for future osteotomy
31.H	1 week	Neck of femur fracture right side	Cancellous screw fixation
32.H	2 weeks	Right side intertrochanteric fracture femur	Dynamic hip screw fixation
33.H	96 weeks	Fracture neck of femur with arthritis	Total hip replacement

		left hip	
34.H	1 week	Intertrochanteric fracture femur right side	Dynamic hip screw fixation
35.H	2 weeks	Intertrochanteric fracture femur right side	Dynamic hip screw fixation
36.H	2 weeks	Neck of femur fracture right side	Bipolar hemiarthroplasty
37.H	2 weeks	Neck of femur fracture right side	Dynamic hip screw fixation with valgus osteotomy
38.H	1 week	Neck of femur fracture right side	Cancellous screw fixation
39.H	1 week	Intertrochanteric fracture right side	Dynamic hip screw fixation
40.H	1 week	Intertrochanteric fracture femur right side	Dynamic hip screw fixation
41.H	1 week	Closed impacted neck of femur fracture left side	Total hip replacement
42.H	1 week	Neck of femur fracture right side	Dynamic hip screw fixation
43.H	1 week	Neck of femur fracture left side	Cancellous screw fixation
44.H	1 week	Neck of femur fracture left side	Cancellous screw fixation
45.H	2 weeks	Neck of femur fracture left side	Bipolar hemiarthroplasty

46.H	6 weeks	Neck of femur fracture right side	Total hip replacement
47.H	1 week	Neck of femur fracture right side	Cancellous screw fixation
48.H	2 weeks	Intertrochanteric fracture femur right side	Open reduction and internal fixation with dynamic hip screw and bone grafting
49.H	2 weeks	Impacted neck of femur fracture right side (stress fracture)	Conservative
50.H	12 weeks	Neck of femur fracture right side	Cancellous screw fixation
51.H	190 weeks	Non-union Subtrochanteric fracture femur with intertrochanteric extension right side	Open reduction and internal fixation with proximal femoral nailing
52.H	8 weeks	Neck of femur fracture right side	Bipolar hemiarthroplasty
53.H	1 week	Neck of femur fracture right side	Bipolar hemiarthroplasty
54.H	2 weeks	Neck of femur fracture right side	Dynamic hip screw fixation
55.H	1 week	Neck of femur fracture left side	Cancellous screw fixation
56.H	1 week	Neck of femur fracture right side	Bipolar hemiarthroplasty
57.H	8 weeks	Intertrochanteric	Open reduction and internal

		fracture non-union femurleft side	fixation with proximal femoral nailing with bone grafting
58.H	4 weeks	Neck of femur fracture left side	Total hip replacement
59.H	21 weeks	Neck of femur fractureright side with avascular necrosis	Total hip replacement
60.H	1 week	Neck of femur fracture left side	Bipolar hemiarthroplasty
61.H	1 week	Intertrochanteric fracture femurleft side	Closed reduction and proximal femoral nailing
62.H	4 weeks	Neck of femur fracture right side	Bipolar hemiarthroplasty
63.H	21 weeks	Neck of femur fracture right side	Bipolar hemiarthroplasty
64.H	24 weeks	Head and neck of femur fracture right side	Bipolar hemiarthroplasty
65.H	2 weeks	Intertrochanteric fracture left side	Dynamic hip screw fixation
66.H	2 weeks	Intertrochanteric fracture right side	Open reduction and internal fixation with proximal femoral nailing
67.H	48 weeks	Acetabulum fracture with protrusioacetabuli	Total hip replacement with anti protrusio cage
68.H	1 week	Posterior dislocation right	Open reduction and capsular repair

		hip	
69.H	2 weeks	Neck of femur fracture left side	Total hip replacement
70.H	2 weeks	Intertrochanteric fracture femur right side	Open reduction with dynamic hip screw fixation
71.H	12 weeks	Intertrochanteric fracture femur right side	Open reduction internal fixation with dynamic hip screw and bone grafting
72.H	2 weeks	Neck of femur fracture right side	Closed reduction and cancellous screw fixation
73.H	4 weeks	Intertrochanteric fractures left femur	Open reduction and internal fixation with dynamic condylar screw with bone grafting
74.H	12 weeks	Malunited intertrochanteric fracture right femur	Conservative
75.H	12 weeks	Intertrochanteric fracture femur right side	Open reduction and internal fixation with dynamic condylar screw and bone grafting
76.H	8 weeks	Neck of femur fracture left side	Total hip replacement
77.H	4 weeks	Neck of femur fracture left side	Bipolar hemiarthroplasty
78.H	1 week	Neck of femur fracture right side	Closed reduction and cancellous screw fixation
79.H	2 weeks	Neck of femur fracture right side	Open reduction and cancellous screw fixation
80.H	8 weeks	Neck of femur	Total hip replacement

		fracture left side	
81.H	4 weeks	Intertrochanteric fracture right side	Open reduction and internal fixation with dynamic hip screw with bone grafting
82.H	24 weeks	Intertrochanteric fracture right femur	Open reduction and internal fixation with dynamic condylar screw and bone grafting
83.H	1 week	Intertrochanteric fracture right femur	Dynamic hip screw fixation
84.H	2 weeks	Intertrochanteric fracture left femur	Open reduction and internal fixation with dynamic hip screw
85.H	8 weeks	Intertrochanteric fracture right femur	Open reduction and internal fixation with dynamic condylar screw and bone grafting
86.H	1 week	Neck of femur fracture left side	Closed reduction and cancellous screw fixation
87.H	4 weeks	Neck of femur fracture right side	Bipolar hemiarthroplasty
88.H	36 weeks	Neck of femur fracture right side	Bipolar hemiarthroplasty with adductor tenotomy
89.H	2 weeks	Neck of femur fracture right side	Bipolar hemiarthroplasty
90.H	2 weeks	Neck of femur fracture right side	Bipolar hemiarthroplasty
91.H	8 weeks	Neck of femur fracture left side	Total hip replacement with adductor tenotomy
92.H	24 weeks	Neck of femur fracture left side	Total hip replacement

93.H	5 week	Posterior dislocation of hip	Open reduction with Steinmann pin trans fixation of greater trochanter to acetabulum
94.H	8 weeks	Neck of femur fracture left side	Total hip replacement
95.H	1 week	Neck of femur fracture right side	Total hip replacement
96.H	3 weeks	Anterior dislocation of hip obturator type	Girdlestone arthroplasty

Post intervention stage:

For intertrochanteric fracture fixed with dynamic hip screw, mobilization was begun based on the intra operative reduction achieved and the challenges faced in the process. In some cases, the patients were mobilized with walker even on the next day of surgery while in few cases; mobilization was prevented even up to 4 weeks.

In cases in which proximal femoral nailing and dynamic condylar screw fixation was done the mobilization was begun bases on intra operative reduction obtained.

But in all the cases muscle strengthening exercises were started the very next post-operative day, to strengthen the weakened musculature caused due to disuse in the neglected limb.

In cases where prosthetic replacement procedure was done weight bearing was initiated as early as possible.

Harris Hip Score is used commonly to analyze the outcome of surgeries of the hip and to evaluate various hip disabilities and the modalities of treatment in adults.

Table 10: Harris hip score

I. Pain- total 44

None/ ignores the pain	44
Occasional with no compromise in activities	40
Mild pain, no effect on normal activities , or pain present after normal activities, or uses aspirin	30
Moderately able to tolerate it, adjusts, occasional use of codeine	20
Serious pain	10
Totally disabled	0

II. Function- total 47

GAIT

Limp	
None	11
Slight	8
Moderate	5
Severe	0
Inability to walk	0

Support	
None	11
Cane for long walk	7
Cane all the time	5
One crutch	3
Two canes	2
Two crutches	0
Unable to walk	0
Distance walked	
Unlimited	11
Six blocks	8
Two or three blocks	5
Indoors only	2
Bed and chair	0

B. FUNCTIONAL ACTIVITIES- total 14

Stairs	
Normally	4
Normally with holding support	2
Any method	1
Unable	0
Shoes and socks	
Easily	4
Difficult	2
Unable	0

Sitting	
Any chair-1 hour	5
On a high surface – 1 to 1 ½ hr	3
Unable to sit comfortably in any chair	0
Public transportation	
Able to get into a bus	1
Cannot board a bus	0

Table 11: Grading system for Harris hip score

Grade	Score
90-100	Excellent
80-89	Good
70-79	Fair
<70	Poor

KNEE JOINT:

17 cases were admitted during our study period. Of which 15 cases were natively treated and 1 case reported to our hospital without any treatment because of poor accessibility from his area of residence and 1 more case because of neglect due to mental illness.

Pre-intervention stage:

Neglected injuries are very rarely reported as it is associated with severe pain and disability which forces the patient to seek immediate attention. Despite this we had reported 17 cases of periarticular knee

injuries. The patients presented with stiff knee or unstable knee, and the stiff knee severity depended on native treatment opted and the period of rigid immobilization undergone. They also had history of poultice wrapping, massage sessions, and forceful manipulations done on them. The patients were assessed clinically and were found to have severe restriction in range of motion. The radiological assessment included antero-posterior and lateral views. CT scan was taken in all cases to confirm the pattern of fracture.

Intervention stage:

Intraoperatively the reduction was difficult and required soft tissue release**.** The sclerotic edges of fracture were removed and temporarily fixed with K wires and reduction clamps and then plate osteosynthesis was done for 12 cases of tibial plateau and supracondylar femur fractures. Out of them 6 cases needed bone grafting procedure. There were 4 patella fractures for which modified tension band wiring was done with or without circlage. 1 case of head of fibula fracture needed common peroneal exploration, as the patient presented with foot drop.

Table 12: Diagnosis and procedure done for neglected injuries involving Knee joint

Case no.	Diagnosis / duration of neglect	Procedure done
1K	Supracondylar Fracture femur with tibial spine avulsion right side / 1 week	Open reduction and internal fixation with distal femur locking compression plate
2K	Left patella fracture / 16 weeks	Modified tension band wiring with bone grafting
3K	Supracondylar fracture left femur / 1 week	Open reduction and internal fixation with distal femur locking compression plating and bone grafting
4K	Proximal tibia fracture right side / 3 weeks	Open reduction and internal fixation with medial column proximal tibia Locking compression plate
5K	Left patella fracture / 1 week	Modified tension band wiring
6K	Fracture nonunion right patella / 8 weeks	Modified tension band wiring with bone grafting
7K	Fracture nonunion distal right femur / 24 weeks	Open reduction and internal fixation with distal femur locking compression plate with bone grafting
8K	Right tibial plateau fracture / 1.5 weeks	Open reduction and internal fixation with bicolumn proximal tibia locking compression plating
9K	Supracondylar fracture right femur / 3 weeks	Open reduction and internal fixation with distal femur locking compression plate with bone grafting

10K	Comminuted fracture right patella / 4 weeks	Patella circlage with loose fragment removal
11K	Medial condyle fracturefemur with tibia lateral condyle fracture with patella fracture right side / 24 weeks	Open reduction and internal fixation with buttress plating for medial condyle femur and lateral condyle tibia with patella circlage
12K	Bicondylar fracture with tibial plateau fracture right side / 3 weeks	Open reduction and internal fixation with bicolumn proximal tibia locking compression plating
13K	Supracondylar fracture right femur / 1week	Open reduction and internal fixation with distal femur locking compression plate with bone grafting
14K	Comminuted Supracondylar fracture left femur / 2 weeks	Open reduction and internal fixation with distal femur locking compression plate with bone grafting
15K	Head of fibula fracture with foot drop / 32 weeks	Open exploration of common peroneal nerve and resection of fibula head
16K	Left patella fracture / 3 weeks	Modified tension band wiring
17K	Right supracondylar fracture / 36 weeks	Open reduction and internal fixation with distal femur locking compression plate with bone grafting

Post-intervention stage:

In distal femoral fractures,ranges of motion exercises were started on 2nd postoperative day. Weight bearing was allowed only after the consolidation of fractureoccurred.

In knee injuries, posttraumatic quadriceps contracture is an important disabling factor which needed intra operative knee mobilization and arthrolysis in most cases with increased duration of neglect.

In tibial plateau fractures the knee was placed in posterior splint for a period of 3 to 4 days after which removal of splint was done and range of motion exercises were begun. Non weight bearing in selected cases were advocated in case of unsatisfactory reduction even up to a period of 16 weeks. In patella fractures, weight bearing was allowed as early as possible.

Bostman knee Score is used commonly to analyze the outcome of surgeries of the hip and to evaluate various hip disabilities and the modalities of treatment in adults.

Table 13: Bostman knee score

Parameter	Score
Range of motion Full extension range of motion > 120	6
Full extension 90-120	3
Pain No pain or minimal pain with activity requiring exertion	6
Moderate pain with activity requiring exertion	3
Pain during daily activities	0
Work Regular job Alternate job Not possible to work	 4 2 0
Atrophy of affected limb <12mm 12-25mm >25mm	 4 2 0
Walking No assistance needed Cane assistance part time Cane assistance full time	 4 2 0
Joint effusion None Patient reported the presence Presence confirmed	 2 1 0
Instability /giving way None Sometimes Daily life	 2 1 0
Stair climbing Normal Difficult Not possible	 2 1 0

Table 14: Grading system for Bostman knee score

Grade	Score
Excellent	30-28
Good	27-20
Unsatisfactory	<20

ANKLE JOINT

13 cases of neglected periarticular ankle injuries presented to our hospital.All patients were natively treated and they all had history of forceful manipulation and binding with bamboo sticks.

Pre-intervention stage:

All patients presented with pain and swelling with moderate to severe impairment of daily functions. The period of neglect ranged from 1 week to 144 weeks. The 4 patients with increased duration of neglect had developed posttraumatic arthritis. Radiological views taken were antero-posterior, lateral,Mortise and inversion stress views were taken. CT scan was taken to completely study the pattern of fractures and to plan for surgery. And in 4 cases with posttraumatic arthritis were planned for arthrodesis.

Intervention stage:

4 cases with evident posttraumatic arthritis underwent arthrodesis of the involved joint, with screw fixation in 2 cases, intramedullary

nailing in one case and Illizarov application in one case. For 4 cases of trimalleolar fracture, Volkmann component was fixed based on intraoperative findings of stability of the ankle joint. For medial malleolar fractures 4mm malleolar screw was used and fibular fracture 1/3rd tubular plate was used and fixation was done. The detailed diagnosis and procedure undertaken for all patients are given in table 15.

Table 15: Diagnosis and procedure done for neglected injuries involving Ankle joint

Case no.	Diagnosis / duration of neglect	Procedure done
1A	Bimalleolar fracture right ankle / 6 weeks	Open reduction and internal fixation with medial malleolus screw and fibular plating
2A	Bimalleolar fracture left ankle / 144 weeks	Ankle arthrodesis with intramedullary nailing
3A	Tibial pilon fracture with lateral malleolus fracture right side / 2 weeks	Open reduction and internal fixation with medial malleolus screw and fibular plating buttress plating for distal tibia
4A	Right talus fracture / 48 weeks	Open reduction and internal fixation with screw fixation
5A	Trimalleolar fracture right ankle / 1 week	Open reduction and internal fixation with medial malleolus screw and fibular plating
6A	Trimalleolar fracture left ankle / 2 weeks	Open reduction and internal fixation with medial malleolus

		screw and fibular plating buttress plating for distal tibia
7A	Trimalleolar fracture right ankle / 8 weeks	Open reduction and internal fixation with medial malleolus screw and fibular plating buttress plating for distal tibia
8A	Nonunion medial malleolus fracture with distal 1/3rd tibia fibula fracture right side / 32 weeks	illizarov application
9A	Medial malleolus fracture left side / 1 week	Open reduction and internal fixation with screw fixation
10A	Trimalleolar fracture right ankle / 48 weeks	Ankle arthrodesis with screw fixation
11A	Right talus fracture with medial malleolus fracture / 20 weeks	Open reduction and internal fixation with screw fixation and percutaneous talus screw fixation
12A	Left side ankle injury with post traumatic arthritis / 4 weeks	Ankle arthrodesis with screw fixation
13A	Trimalleolar fracture right ankle / 8 weeks	Open reduction and internal fixation with medial malleolus screw and fibular plating and buttress plating for distal tibia

Post-intervention stage:

Ankle was immobilized in a posterior plaster splint in neutral position and kept in an elevated plane. After 4 days intermittent range of motion exercises were done with a removable splint. Weight bearing was delayed upto 16 weeks and the patient was allowed to bear weight with a short leg walking cast.

For fractures involving tibial pilon, ankle dorsiflexion was allowed immediately after surgery. Full weight bearing was allowed after radiological evidence of union was seen.

Table 16: Karlsson and Peterson ankle score

Parameter	Score
Pain	
No pain	20
Pain during exercise	15
During walking on uneven surface	10
Walking on even surface	5
Constant pain	0
Swelling	
No swelling	10
Swelling post exercise	5
Constant swelling	0
Joint instability	
No	25
1-2 episodes per year during exercise	20
1-2 episodes per month during exercise	15

On walking in uneven surface	10
On walking in even surface	5
Constant needs ankle support	0
Joint stiffness	
No	5
Moderate	2
Marked	0
Stair climbing	
No problems	10
Impaired	5
Impossible	0
Activity	
Same as pre injury	15
Same work, less sports	10
Lighter work	5
Severe impaired	0
Support	
No support	5
Ankle support during exercise	2
Ankle support for daily activities	0

Table 17: Grading system for ankle score

Grade	Score
95 or more	Excellent
80-95	Acceptable
<79	Below unacceptable

Exclusion criteria

The following cases were excluded from the study as they might alter the outcome of the study.

- Intra articular fractures
- Physeal injuries
- Polytrauma patients
- Grossly contaminated open injuries
- Injuries of the spine
- Implant/prostheses failures
- Those who had absconded or discontinued from the therapy.

Statistical analysis:

Statistical analysis was done using SPSS software version 17. Mean and standard deviation for age, duration of neglect, scoring systems, visual analog scale pre and post procedure and post follow up was done. Comparison studies were done with confidence interval 95% and $p<0.05$. Descriptive statistics were applied and frequency distribution was found for each joint parameter under evaluation. Sample proportion for neglected cases was determined.

RESULTS

RESULTS

This prospective and retrospective study done during the period of January 2015 to December 2015 provided us with a large data of cases with joint injuries who came to our hospital including the patients who had come immediately after injury and also patient who had come after period of delay/neglect. This data was used to determine the extent of neglected musculoskeletal injuries around the major joints present in our society as a non-communicable disease. As the patients visiting our General Hospital were from Chennai and surrounding urban and rural areas this data could provide valuable insight regarding the neglected musculoskeletal injuries in our State of Tamil Nadu, Pondicherry Union Territory as well as neighboring States of Seemandhra, Telengana and Karnataka.

To determine the exact prevalence in a limited population group Sample proportion calculation was used.

The sample proportion calculation was done using the formula

$$\text{Sample proportion} = \frac{\text{number of neglected cases}}{\text{Sample size}}$$

Total number of cases with dislocations, fracture dislocations and periarticular fractures were 615

Total number of neglected cases = 160

Sample proportion of neglected cases = 26%

This shows that there are a high number of neglected musculoskeletal injuries still prevalent in our society. 26% of the total admitted periarticular cases in our general hospital are of the neglected category.

Age attributed proportion

Based on the number of cases within each age group and the total number of neglected cases the age attributed proportion was calculated and a detailed analysis joint wise is given in Table -18.This has proved that increase in age is directly proportional to the increase in percentage of neglected cases. This proportion dramatically rises after the age of 50 years. Hence age has a direct relation with neglected musculoskeletal injuries proportion.

Table 18: Age attributed proportion

Age range (in years)	Shoulder	Elbow	Wrist	Hip	Knee	Ankle	**Percentage %**
14-23	1	6	1	5	3	1	**11%**
24-33	1	4	2	6	2	4	**12%**
34-43	1	3	0	14	4	5	**16%**
44-53	2	2	1	19	3	3	**19%**
54-60	6	1	3	52	5	0	**42%**
Total	11	16	7	96	17	13	**160 cases 100%**

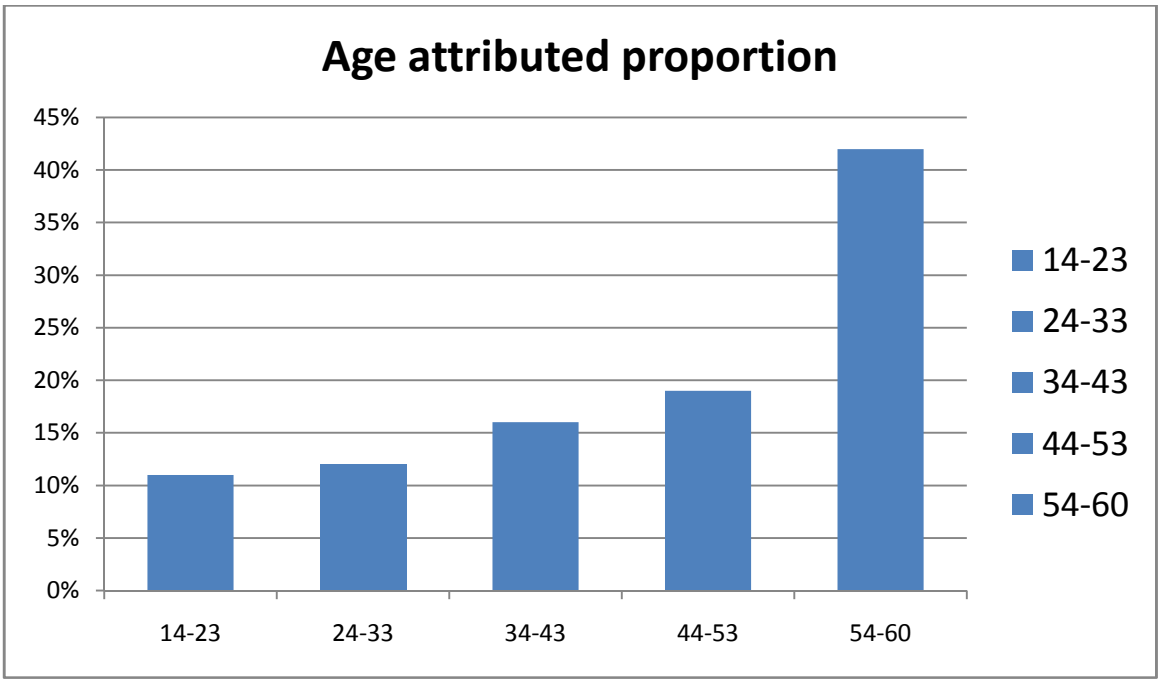


Chart 1: AGE ATTRIBUTED PROPORTION

Gender attributed proportion

This calculation was done to determine the influence of gender on the proportion of neglected musculoskeletal injuries. Except in shoulder cases all other joint involvement showed increased neglected injuries among males than in females.

This may be due to:

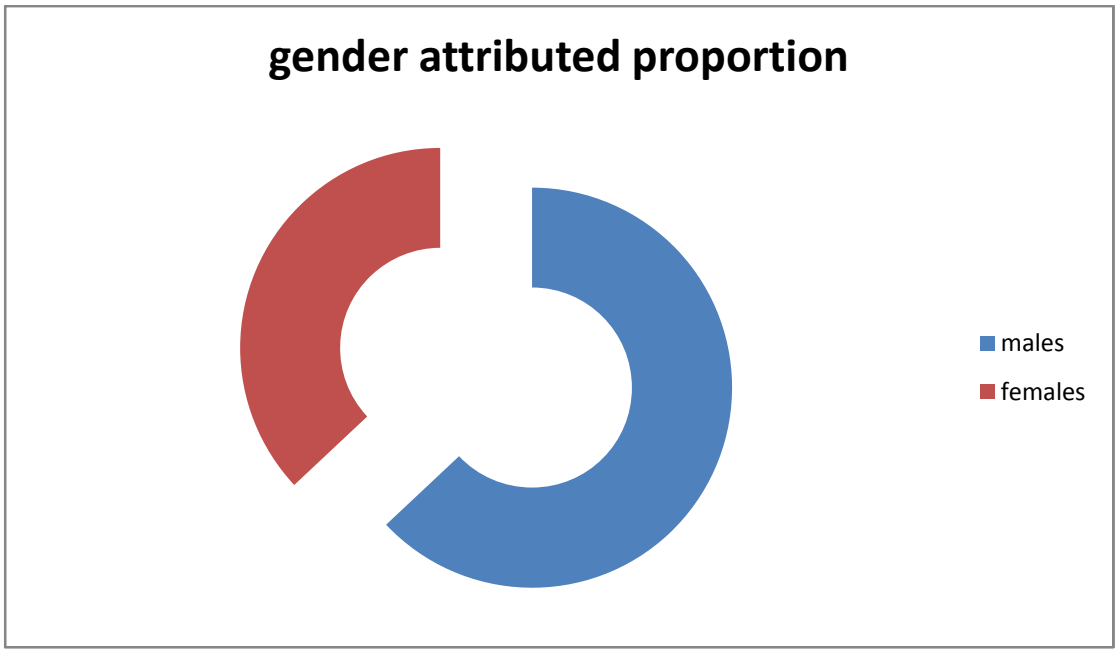
- Increased exposure to the risk factors of musculoskeletal injuries in males.
- Decreased compliance and cooperation among females and their family members for a long orthopaedic management for neglected injuries.
- The general attitude in males towards seeking native treatment.

The detailed analysis is shown in table 19.

Table 19: Gender attributed proportion

Joint involved	Males	Females	Total
Shoulder	5	6	11
Elbow	11	5	16
Wrist	6	1	7
Hip	56	40	96
Knee	13	4	17
Ankle	10	3	13
Percentage	**63%**	**37%**	**160**

Chart 2: GENDER ATTRIBUTED PROPORTION



Sample proportion depending on area of residence

The area of residence being urban or rural plays an important role because the urban population has the advantage of increased accessibility and availability to the orthopedic specialty than the rural population. In our study the proportion of neglected cases from urban population was marginally high in case ofshoulder, wrist, knee and ankle injuries. The proportion in hip and elbow had a wide difference among the two population groups of urban and rural areas. But overall proportion of neglected cases was higher among rural population. The detailed analysis is given in table 20.

Table 20: Area of residence proportion

Joint involved	Urban	Rural	Total
Shoulder	7	4	11
Elbow	3	13	16
Wrist	5	2	7
Hip	35	61	96
Knee	9	8	17
Ankle	6	7	13
Percentage	**41%**	**59%**	**160**

Cause of neglect attributed proportion

The proportion calculation was done based on the “cause of neglect” for all the joint injuries. The three major causes found in our study and their proportions were:

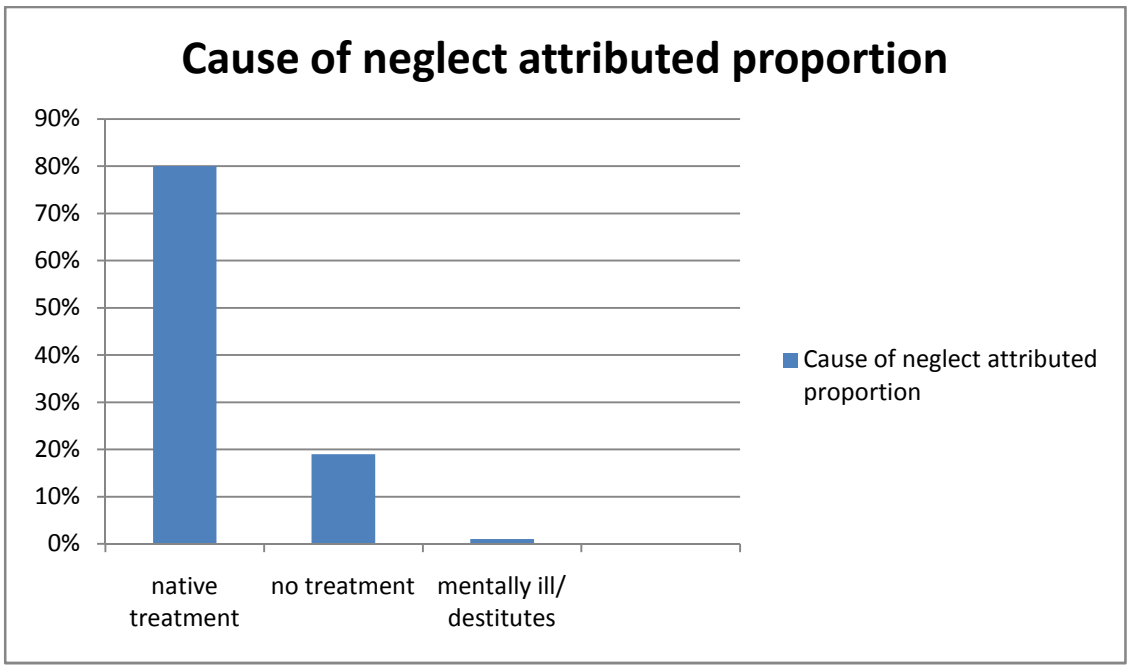
- Native treatment 80%
- No treatment - 19%, due to reasons like
  - Poor accessibility from rural areas 18%
  - General ignorance 1%
- Neglect in mentally challenged and destitute patients due to lack or neglect of caregivers 1%

The detailed analysis joint attributed is given in table 21.

Table 21: Cause of neglect attributed proportion

Joint involved	Native treatment	No treatment	Neglect in mentally challenged and destitute individuals
Shoulder	11	-	-
Elbow	16	-	-
Wrist	6	-	1
Hip	67	29	-
Knee	14	2	1
Ankle	13	-	-
Percentage	**80%**	**19%**	**1%**

Chart 3:CAUSE OF NEGLECT ATTRIBUTED PROPORTION



Extremity attributed sample proportion

The proportion calculation attributed to extremity involvement was done to determine the variations in the number of neglected injuries in upper limbs and lower limbs.

Total number of cases involving joints of upper extremity = 176

Total neglected cases involving joints of upper extremity = 34

Sample proportion for neglected upper extremity cases = 19%

Total number of cases involving joints of lower extremity = 439

Total neglected cases involving joints of lower extremity = 126

Sample proportion for neglected lower extremity cases = 28%

There is increased proportion of neglected cases among lower extremity than upper extremity among our study population.

Joint attributed sample proportion

The proportion calculationaccording to the joint involved was done to determine the burden of neglected injuries and to assess the reasons behind it.

Total number of shoulder cases = 70

Total number of neglected shoulder cases = 11

Sample proportion of neglected shoulder cases = 15%

Total number of elbow cases = 64

Total number of neglected elbow cases = 16

Sample proportion of neglected elbow cases = 25%

Total number of wrist cases = 42

Total number of neglected wrist cases = 7

Sample proportion of neglected wrist cases = 16%

Total number of hip cases = 262

Total number of neglected hip cases = 96

Sample proportion of neglected hip cases = 36%

Total number of knee cases = 100

Total number of neglected knee cases = 17

Sample proportion of neglected knee cases = 17%

Total number of ankle cases = 77

Total number of neglected ankle cases = 13

Sample proportion of neglected ankle cases = 16%

The proportion of neglected injuries joint attributed in an increasing order is found in hip, elbow, knee, ankle, wrist, shoulder joints.

OUTCOME ANALYSIS

The outcome of each joint injury after intervention and last follow up has been explained for each joint in the following sections detailing about the patients' history of neglect, area of residence, gender difference, follow up period, functional range of motion achieved

compared to the time of presentation and final outcome based on functional evaluation score.

Shoulder joint outcome analysis

11 neglected cases reported to our hospital from January 2015 to December 2015, out of them 5 were males and 6 were females. 6 were from urban area and 5 were from rural area. They all had a mean±S.D period of neglect of 6.36±7.39. The pre procedure VAS mean±S.D was 7.81± 0.87. All cases were followed up for 6 months to 1 year. The post procedure and rehabilitation period VAS mean±S.D was 1.09±1.22. The functional range of motion achieved after intervention was satisfactory compared to pre intervention range. The mean ± S.D of the range of motion achieved is given in table 22. At the end of last follow up cases 2S, 3S, 4S, 5S and 11S had excellent outcomes; case 1S, 6S, 8S, 10S had good outcome; case 7S and 9S had fair outcome. The mean functional score 82 and overall outcome was good.

Table 22: Functional range of motion - shoulder joint

Case	Flexion In degrees	Abduction In degrees	Adduction Internal rotation In degrees	Adduction External rotation In degrees
Mean ± S.D	135±5.77	125 ±5.77	27.5 ± 5	60 ±8.16

Table 23: Pre and Post procedure evaluation for neglected injuries involving shoulder joint

Case no.	Age/gender	Duration of neglect (in weeks)	Pre-procedure VAS	Post-procedure VAS	Follow up (in months)	Functional score
1S	23/M	12	7	2	12	Good (85)
2S	60/F	1	8	0	12	Excellent (90)
3S	50/F	1	8	0	12	Excellent (90)
4S	58/F	2	9	0	12	Excellent (90)
5S	60/M	1	9	0	12	Excellent (90)
6S	46/F	2	8	1	12	Good (85)
7S	35/M	12	7	3	12	Fair (65)
8S	28/M	4	7	1	6	Good (85)
9S	54/F	24	7	3	12	Fair (60)
10S	60/F	10	7	2	12	Good (80)
11S	55/M	1	9	0	12	Excellent (90)

Elbow joint outcome analysis

16 cases of neglected injuries involving elbow joint were admitted during the study period. Out of them 11 were males and 5 were females. 2 were from urban areas and 14 were from rural areas. Duration of neglect ranges from 2 weeks to 48 weeks with mean± S.D of 16.06 ± 13.53. The

pre procedure VAS mean± S.D was 7.75±1.12. The post procedure VAS mean± S.D was 0.87± 0.95. All the cases had common cause of neglect: opting for alternate treatment methods in the form of herbal healers, quacks and traditional bonesetters. All cases were followed up for 1 year at the end of which cases 1E, 7E, 9E, 10E, 13E, 14E, 16E had excellent outcome, cases 2E, 3E, 4E, 5E, 6E, 11E, 12E, 15E and case 8E alone had fair outcome. The mean score was 86 and outcome was good overall. The functional range of motion achieved was good compared to the time of presentation. The mean functional range of motion is given in Table 24.

Table 24: Functional range of motion elbow joint

Case	**Elbow flexion arc (in degrees)**	**Elbow extension arc (in degrees) Supination**	**Elbow extension arc (in degrees) Pronation**
Mean	85±7.88	45 ± 4.66	46 ±3.11

Table 25: Pre and Post procedure evaluation for neglected injuries involving elbow joint

Case no.	Age/gender	Duration of neglect (in weeks)	Pre-procedure VAS	Post-procedure VAS	Follow up (in months)	Functional score
1E	25/M	12	7	0	12	Excellent (95)
2E	30/M	10	8	2	12	Good (85)
3E	35/M	24	8	2	12	Good (80)
4E	16/M	32	6	2	12	Good (85)
5E	15/M	12	9	1	12	Good (85)
6E	14/M	16	8	1	12	Good (85)
7E	14/F	4	9	0	12	Excellent (95)
8E	60/F	48	6	3	12	Fair (65)
9E	15/M	3	9	0	12	Excellent (95)
10E	47/M	40	6	0	12	Excellent (90)
11E	42/M	16	7	1	12	Good (85)
12E	23/F	15	7	1	12	Good (85)
13E	32/F	8	8	0	12	Excellent (95)
14E	45/M	12	8	0	12	Excellent (90)
15E	26/F	2	9	1	12	Good (80)
16E	39/M	3	9	0	12	Excellent (90)

Wrist joint outcome analysis

Totally 7 neglected cases with injuries involving wrist joint were seen. Out of them 6 were males and 1 was female. Duration of neglect ranged from 1 week to 18 weeks with mean± S.D was 7± 6.37. Pre procedure VAS mean± S.D was 8.14±0.89. Post procedure VAS mean± S.D was 1.28±0.95.At the end of 1 year follow up of 4 cases had excellent outcome and 3 cases had good outcome. The cause for neglect was opting for native methods of treatment in all cases except case 2W who was a patient of chronic mental disorder and the patient's injury got neglected due to lack of care takers. The functional range of motion achieved was good compared to the time of presentation. The mean functional range of motion is given in Table 26. The mean outcome score was 90 and the overall outcome was excellent.

Table 26: Functional range of motion of wrist joint

Case	Extension (in degrees)	Flexion (in degrees)	Ulnar deviation (in degrees)	Radial deviation (in degrees)
Mean± S.D	65±4.33	55± 2.78	44± 1.22	18 ± 0.88

Table 27: Pre and Post procedure evaluation for neglected injuries involving wrist joint

Case no.	Age/gender	Duration of neglect (in weeks)	Pre-procedure VAS	Post-procedure VAS	Follow up (in months)	Functional score
1W	25/M	18	7	1	12	Good (85)
2W	60/M	12	7	1	12	Excellent (95)
3W	60/F	1	9	3	12	Good (85)
4W	18/M	1	9	2	12	Good (85)
5W	25/M	7	8	0	12	Excellent (95)
6W	53/M	8	8	1	12	Excellent (95)
7W	60/M	2	9	1	12	Excellent (95)

Hip joint outcome analysis

Totally 96 cases presented with neglected injuries involving hip joint. 56 cases were males and 40 were female patients. 35 patients were from urban areas and 61 patients were from rural areas. Duration of neglect ranged from 1 to 190 weeks, with mean ±S.D was 8.63 ±22.32. Pre procedure VAS mean ±S.D was 8.30± 0.90. Post procedure VAS mean ±S.D was 1.56± 0.81. At the end of follow up period of one year, 37 cases had excellent, 39 had good and 20 had fair outcomes. The mean functional score was 85 and the overall outcome was good. The functional range of motion achieved at the end of follow up period was

assessed by the ability of the patient to do straight leg-raising against gravity in supine position and abduction in lateral position against gravity. The mean straight leg raising was 40º and mean abduction against gravity was 30º.

Table 28: Post intervention Functional range of motion of Hip joint

Cases	Hip in extension Internal rotation (In degrees)	Hip in extension External rotation (In degrees)	Hip in flexion Internal rotation (In degrees)	Hip in flexion External rotation (In degrees)
Mean ±S.D	15±5.22	35±4.31	16 ±3.45	34 ±3.13

Table 29: Pre and Post procedure evaluation for neglected injuries involving Hip joint

Case no.	Age	Gender	Duration of neglect (in weeks)	Pre procedure VAS	Post procedure VAS	Functional score
1. H	45	M	1 week	9	1	Excellent (92)
2. H	31	M	8 weeks	7	1	Excellent (94)
3. H	57	M	4 weeks	8	2	Good (83)
4. H	34	F	20 weeks	6	2	Good (82)
5. H	58	F	12 weeks	7	3	Fair (74)
6. H	60	F	2 weeks	8	2	Excellent (96)
7. H	60	M	3 weeks	8	2	Good (86)
8. H	80	F	4 weeks	8	2	Good (85)
9. H	60	M	20 weeks	8	3	Fair (77)
10.H	55	M	3 weeks	9	1	Excellent (90)
11.H	57	M	2 weeks	9	1	Excellent (93)
12.H	31	M	1 week	9	1	Excellent (94)
13.H	60	F	1 week	9	2	Good (87)
14.H	50	F	12 weeks	7	1	Fair (74)
15.H	60	F	1 week	9	1	Excellent (96)
16.H	35	M	1 week	9	3	Fair (76)
17.H	51	M	1 week	9	1	Excellent (97)

18.H	35	M	2 weeks	9	0	Good (84)
19.H	57	F	1 week	9	0	Good (86)
20.H	60	M	12 weeks	8	2	Good (83)
21.H	50	F	2 weeks	9	1	Excellent (92)
22.H	14	M	1 week	9	0	Excellent (94)
23.H	14	M	2 weeks	9	1	Good (81)
24.H	51	M	3 weeks	9	1	Fair (77)
25.H	44	M	12 weeks	7	2	Good (84)
26.H	60	F	8 weeks	8	2	Good (86)
27.H	60	F	1 week	9	1	Excellent (95)
28.H	60	F	1 week	9	1	Excellent (94)
29.H	60	F	1 week	9	1	Good (87)
30.H	57	M	12 weeks	8	3	Fair (77)
31.H	55	M	1 week	8	2	Good (88)
32.H	33	F	2 weeks	9	1	Excellent (93)
33.H	60	F	96 weeks	7	2	Good (89)
34.H	60	M	1 week	9	1	Excellent (91)
35.H	37	M	2 weeks	9	1	Excellent (94)
36.H	60	F	2 weeks	9	1	Good (84)
37.H	45	F	2 weeks	9	1	Good (86)
38.H	46	M	1 week	9	0	Excellent (90)

39.H	38	M	1 week	9	0	Excellent (93)
40.H	60	F	1 week	9	1	Excellent (96)
41.H	60	M	1 week	9	1	Excellent (94)
42.H	60	F	1 week	9	3	Fair (73)
43.H	60	M	1 week	9	1	Good (84)
44.H	60	F	1 week	9	1	Good (83)
45.H	60	F	2 weeks	9	1	Good (81)
46.H	43	M	6 weeks	8	2	Good (87)
47.H	55	F	1 week	9	1	Excellent (91)
48.H	60	M	2 weeks	9	1	Excellent (93)
49.H	45	M	2 weeks	8	3	Fair (77)
50.H	19	M	12 weeks	7	2	Good (86)
51.H	28	M	190 weeks	6	2	Good (88)
52.H	60	M	8 weeks	7	2	Good (84)
53.H	60	F	1 week	9	2	Good (83)
54.H	49	F	2 weeks	9	2	Good (82)
55.H	45	M	1 week	9	1	Excellent (92)
56.H	53	F	1 week	9	1	Excellent (95)
57.H	35	M	8 weeks	7	2	Good (86)
58.H	42	M	4 weeks	8	2	Good (87)
59.H	40	F	21 weeks	6	1	Good (89)

60.H	60	F	1 week	9	1	Excellent (93)
61.H	60	M	1 week	9	1	Excellent (92)
62.H	60	M	4 weeks	8	2	Good (84)
63.H	60	F	21 weeks	7	3	Fair (76)
64.H	40	F	24 weeks	7	3	Fair (74)
65.H	60	F	2 weeks	9	1	Excellent (91)
66.H	30	F	2 weeks	9	0	Excellent (94)
67.H	45	M	48 weeks	7	2	Good (83)
68.H	25	M	1 week	9	1	Excellent (97)
69.H	45	F	2 weeks	9	1	Good (78)
70.H	17	M	2 weeks	9	1	Excellent (96)
71.H	60	M	12 weeks	8	3	Fair (76)
72.H	40	M	2 weeks	8	2	Good (86)
73.H	38	M	4 weeks	8	1	Excellent (91)
74.H	55	F	12 weeks	8	3	Fair (77)
75.H	60	M	12 weeks	8	3	Good (87)
76.H	60	F	8 weeks	8	3	Fair (77)
77.H	56	M	4 weeks	8	2	Good (89)
78.H	60	F	1 week	9	1	Excellent (93)
79.H	45	M	2 weeks	9	1	Good (89)
80.H	45	M	8 weeks	7	2	Fair (73)

81.H	54	M	4 weeks	7	2	Excellent (92)
82.H	60	M	24 weeks	6	2	Fair (72)
83.H	55	M	1 week	9	1	Excellent (96)
84.H	42	M	2 weeks	9	1	Excellent (92)
85.H	60	M	8 weeks	9	2	Fair (73)
86.H	60	M	1 week	9	1	Excellent (98)
87.H	49	M	4 weeks	8	3	Fair (74)
88.H	22	M	36 weeks	7	3	Fair (73)
89.H	45	M	2 weeks	9	2	Good (83)
90.H	50	F	2 weeks	9	2	Good (82)
91.H	40	F	8 weeks	7	2	Fair (77)
92.H	60	M	24 weeks	7	2	Fair (77)
93.H	25	M	6 week	9	1	Excellent (96)
94.H	56	F	8 weeks	7	2	Good (86)
95.H	55	F	1 week	9	1	Excellent (98)
96.H	58	F	3 weeks	9	1	Good (88)

Knee joint outcome analysis

17 cases had been admitted in our hospital with injuries involving knee joint. There were 13 male patients and 4 female patients in our study. 9 patients were from urban area and 8 patients were from rural areas. Out of the total cases 14 were natively treated, 2 patients had not

undergone any treatment before coming to our hospital and 1 patient, who had history of mental illness, had been neglected because of lack of care givers. The period of neglect ranged from 1 to 36 weeks and mean±S.D was 9.61±11.94. The pre procedure VAS mean± S.D was 7.88±0.92. The post procedure VAS mean± S.D was 1.35±0.86. At the end of follow up of 1 year the functional range of motion achieved was satisfactory. The mean functional range of motion is given in table 29. The outcome was excellent in 9 cases, good in 4 cases and fair in 4 cases. The mean functional score was 26 and the overall outcome was good.

Table 30: Post intervention functional range of motion of knee joint

Cases	Flexion
Mean± S.D	60 ± 0.88

Table 31: Pre and Post procedure evaluation for neglected injuries involving knee joint

Case no.	Age/gender	Duration of neglect (in weeks)	Pre-procedure VAS	Post-procedure VAS	Follow up (in months)	Functional score
1K	40/M	1	9	2	12	Good (25)
2K	40/F	16	6	1	12	Excellent (29)
3K	58/M	1	9	1	12	Excellent (28)
4K	60/M	3	7	1	12	Excellent (28)
5K	50/F	1	9	1	12	Excellent (29)
6K	54/M	8	8	2	12	Good (24)
7K	25/F	24	7	2	12	Good (24)
8K	47/M	1.5	8	0	12	Excellent (29)
9K	21/M	3	8	1	12	Good (25)
10K	60/F	4	8	3	12	Good (22)
11K	40/M	24	7	2	12	Unsatisfactory (19)
12K	41/M	3	8	1	12	Excellent (29)
13K	45/M	1	9	1	12	Excellent (28)
14K	30/M	2	9	3	12	Good (23)
15K	20/M	32	7	0	12	Excellent (29)
16K	60/M	3	8	1	12	Excellent (28)
17K	22/M	36	7	1	12	Good (25)

Outcome analysis of ankle joint

Totally 13 cases were admitted with injuries involving ankle joint in our hospital during our study period. Out of these 10 were males and 3 were female patients. 6 patients were from urban area and 7 patients were from rural areas. All patients had undergone native treatment. The

duration of neglect ranged from 1 week to 144 weeks and the mean± S.D was 24.92±39.66.The pre procedure VAS mean± S.D was 7.69 ±0.57.The post procedure mean± S.D was 1.53± 1.07. After the follow up period of 1 year 4 patients had excellent outcome and 6 had good and 3 had fair outcome. Out of 13 patients 10 were able to walk without any pain and the remaining 3 patients still had residual pain as complication. The mean functional score was 86 and the overall outcome was acceptable.

Table 32: Pre and Post procedure evaluation for neglected injuries involving Ankle joint

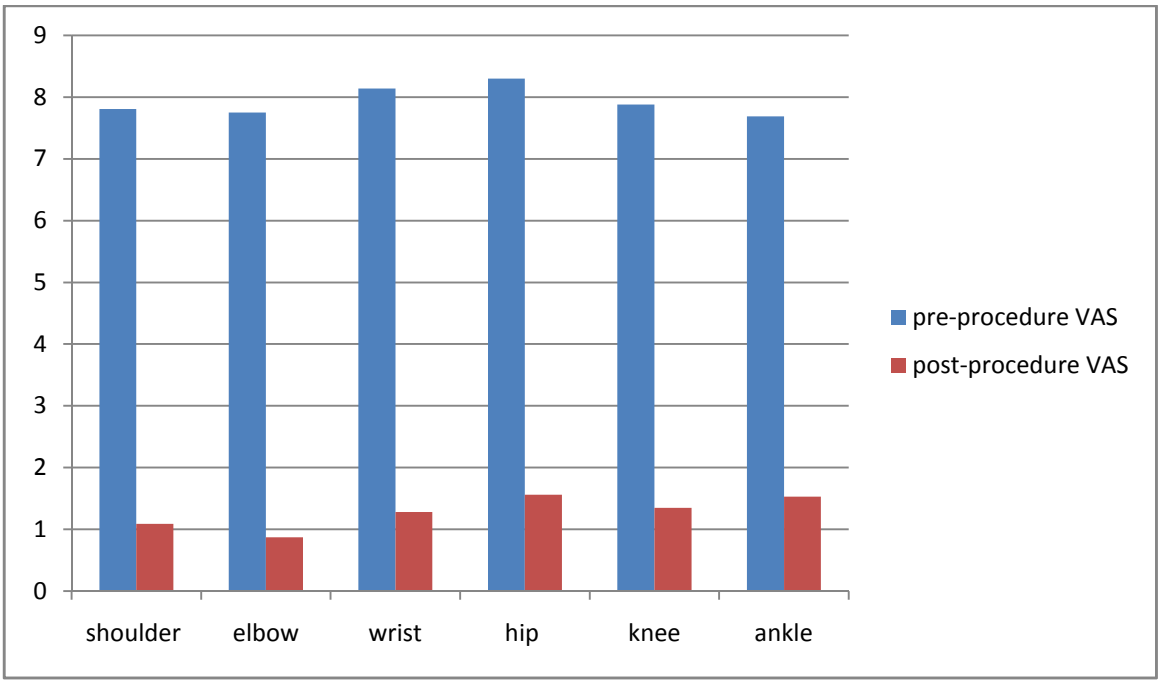
Case no.	Age/gender	Duration of neglect (in weeks)	Pre-procedure VAS	Post-procedure VAS	Follow up (in months)	Functional score
1A	42/M	6	8	0	12	Excellent(96)
2A	42/M	144	6	3	12	Below unacceptable (76)
3A	38/M	2	8	2	12	Acceptable(84)
4A	16/M	48	7	2	12	Acceptable(88)
5A	28/F	1	9	3	12	Below unacceptable (78)
6A	33/M	2	9	0	12	Excellent(96)
7A	44/F	8	7	1	12	Acceptable(88)
8A	34/M	32	7	1	12	Acceptable(90)
9A	26/M	1	9	0	12	Excellent(98)
10A	50/M	48	7	2	12	Acceptable(82)
11A	35/M	20	7	3	12	Below unacceptable (76)
12A	30/M	4	8	1	12	Excellent(96)
13A	44/F	8	8	2	12	Acceptable(88)

The summary of findings in our study is presented in table 32:

Table 33: Summary of results

Parameters	Shoulder	Elbow	Wrist	Hip	Knee	Ankle
Total neglected cases	11	16	7	96	17	13
Period of neglect mean±S.D	6.36±7.39	16.06 ± 13.53	7± 6.37	8.63 ±22.32	9.61±11.94	24.92±39.66
Pre procedure VAS mean±S.D	7.81± 0.87	7.75± 1.12	8.14±0.89	8.30± 0.90	7.88±0.92	7.69 ±0.57
Post procedure VAS mean±S.D	1.09±1.22	0.87± 0.95	1.28±0.95	1.56± 0.81	1.35±0.86	1.53± 1.07
Functional score mean	82	85	90	85	26	86
Outcome mean	Good	Good	Excellent	Good	Good	Acceptable

Chart 4: Comparison between the means of pre- and post- procedure Visual Analogue Scale(VAS)



DISCUSSION

DISCUSSION

The result of our study has proven that neglected musculoskeletal injuries are a persisting epidemic in our country. Our study has shown that 28% of injuries to the major joints reported to our General hospital were neglected. The period of neglect included in our study ranged from 1 week to maximum 190 weeks. The main cause of neglect found in our study was due to native treatment, the percentage of which was 80%. Among those who were admitted in our hospital, 63% of them were males and 59% were from rural areas.

The neglected injuries of the lower extremity were more common than the neglected injuries of the upper extremity. The hip joint was the most common joint where the injuries were neglected; especially in the age group of 54-60 years. The probable cause was found to be the inability of the patient to come to the hospital on his own through any mode of transport. We observed a trend of increasing magnitude of neglected injuries with increase in age.

The native treatment is found to be significantly prevalent in our part of the country. In our study group we encountered wide spectrum of modes of native treatment, the most common was the treatment under the name of “puthurkattu”. Out of the 80% of the study group who had opted for native treatment 41% belonged to rural areas and 39% belonged to urban areas. This marginal difference shows that inspite of the

accessibility and wide availability of orthopedic specialty care centers the prevalence of native treatment induced complications is high in urban areas. This trend shows that there is ignorance and deep rooted false belief in the minds of our people irrespective of the area in which they reside. This has to be addressed first by health education and spreading awareness among the people. This marks the first step in the primordial prevention of neglected musculoskeletal injuries. In a few cases the reason was purely financial, where native treatment was a cheaper alternative. This has been rectified to a great extent at present in the form of Chief Minister's Comprehensive Health Insurance Scheme practiced in our state of Tamil Nadu, which has encouraged the patients to seek medical attention immediately without any worry about the finance.

Shoulder joint outcome analysis

In our study, 4 cases of neglected shoulder dislocations showed excellent results whereas 1 patient showed a fair outcome. This patient had duration of neglect of more than 3 months and had a history of periodical massage and forceful manipulation by the hands of a native bone setter. He also had intra operative finding of incarcerated head beneath the coracoid amidst dense fibrous tissue which warranted excessive soft tissue release.

Mansat et al[40] study on 5 patients with neglected shoulder dislocations had proved that the outcome worsens with increasing duration of neglect.

In fractures associated with proximal humerus we were able to give excellent outcome in a case with 1 week neglect period.

Goga et al[39] have given excellent outcome in a patient with history of neglect for 28 weeks but the patient was young and with less complications.

Hence in isolated dislocation outcome is good till 3 months of neglect period whereas in fractures and fracture dislocation the interval of good outcome decreases with increasing period of neglect.

Elbow joint outcome analysis

In injuries involving elbow joint out of the 16 cases of neglected injuries we were able to give excellent results in 7 cases and good results in 8 cases. This result was achieved till a period of neglect of 48 weeks. The first study regarding neglected elbow dislocation due to native treatment methods were first studied by Speed and Campbell[101]. Many studies like Martini et al have promoted abstention in stiff elbow cases on the verge of functional adaptation. But in our study we have given good results with increased duration of neglect with surgical procedures.

Wrist joint outcome analysis

In our study 7 cases of neglected injuries involving wrist injuries with neglect period up to 18 weeks were treated by surgical procedures to get excellent to good outcome in all patients. There were not many studies regarding natively treated wrist injuries but in a study by Garget al[64] consisting of 16 patients with transscaphoid perilunate fracture dislocation, they have got excellent to good outcome up to 4.5 months.

Hip joint outcome analysis

In our study neglected trochanteric fractures had a better outcome when compared to neglected neck of femur that underwent fixation of fractures. In neck of femur fracture that underwent prosthetic replacements had better outcome than fracture fixations of neglected neck of femur fractures.

The three cases of neglected dislocations up to 6 weeks of neglect showed excellent to good outcomes. These results are consistent with previous studies of Garret et al[69] and Varma BP[71]**.**

Knee joint outcome analysis

Neglected injuries of the knee though are rare we reported 17 cases in period of 1 year itself. All of them had undergone native treatment. We were able to get god outcome overall till a neglect period of 32 weeks.

And one case showed fair outcome in spite of 2 weeks of neglect period due to implant associated infection.

In a similar study by Anand et al[83] in which 12 cases of neglected periarticular proximal tibia fractures they were able to give excellent to good outcome which was comparable to our study.

Ankle joint outcome analysis

In our study out of the 13 cases 4 cases underwent ankle arthrodesis. These patients had post traumatic arthritis. They all had outcomes which were excellent in one case, good in 2 cases and fair in one case, proving that surgical treatment can achieve good functional outcome up to maximum 48 weeks.

In other cases in which fracture fixation was done the overall outcome was good. Mostafa et al[94] study had similar results by performing surgical procedures to restore then length and alignment in neglected ankle injuries.

CONCLUSION

CONCLUSION

The complications and outcome in all the cases depended on many factors as even in some cases with longer neglect duration excellent outcome was possible but in some cases with shorter neglect duration also fair outcome was only possible. The commonly found factors that can influence the outcome of the neglected musculoskeletal injuries in pre intervention stage were:

- Age of patient
- Type of native treatment availed
- Duration of native treatment methods
- Quality of native treatment methods
- Associated co morbidities
- Associated fractures

The factors which influence the outcome in intervention and post intervention stage were:

- Intra operative findings of soft tissue distortion and loss of anatomical configuration
- Type of procedure selected
- Aseptic precautions taken
- Patients' will for functional betterment
- Expertise of the surgeons

- Regularity in visiting the hospital for physiotherapy

In our study most of the patients had a common will for betterment and they cooperated in all the steps and thereby had a successful outcome at the end of follow up. Hence patients' cooperation and perseverance is the foremost quality that defined success for them.

As for the persisting epidemic of neglected musculoskeletal injuries, it can be prevented by spreading awareness among the patients about the treatment methods available for fracture treatment and to ensure that it is widely familiar among urban as well as rural population.

BIBLIOGRAPHY

BIBLIOGRAPHY

1. 1.World Health Organization. Global burden of disease project 2002. Available at :http://www.who.int/healthinfo/ bodproject /en/ index.html
2. Mock C, CherianMN.the global burden of musculoskeletal injuries challenges and solutions.ClinOrthopRelat Res. 2008 Oct; 466(10): 2306–16.
3. Gosselin RA, Spiegel DA, Coughlin R, Zirkle LG. Injuries:the neglected burden in developing countries. Bull World Health Organ. 2009 Apr;87(4):246-246a
4. Mock C, Quansah R, Krishnan R, Arreola-Risa C, Rivara F. Strengthening the prevention and care of injuries worldwide. Lancet. 2004;363:2172–2179.
5. Onoprienko GA[1], BuatchidzeOSh, Sukhonosenko VM.Treatment of neglected complicated multiple musculoskeletal injuries. Clin Orthop Relat Res. 1995 Nov;(320):24-7.
6. Gururaj G. Injuries in India: A national prospective NCMH background papers- burden of disease in India WHO Collaborating centre for Injury Prevention and safety promotion. National Institute of mental Health and Neuro Sciences Bangalore.

7. Saccone M, Jain AK. Fracture healing in India: Available therapies, indications, and protocols.Indian J Orthop. 2009 Apr;43(2):175-81. doi: 10.4103/0019-5413.50853.
8. Arora A, Agarwal A, Gikas P, Mehra A. Musculoskeletal training for orthopaedists and nonorthopaedists: experiences in India.ClinOrthopRelat Res. 2008 Oct; 466(10):2350-9.
9. Bhojwani HR. Developing Innovative Capacity in India to Meet Health Needs. MIHR Report to CIPIH. April 2005.
10. Ashok Kumar Panda and Suvendu Rout.*Putturkattu* (bandage) – A traditional bone setting practice in south India. J Ayurveda Integr Med. 2011 Oct-Dec; 2(4): 174–178.doi: 10.4103/0975-9476.90766
11. Thanni LO. Factors influencing patronage of traditional bone setters.WestAfr J Med. 2000 Jul-Sep;19(3):220-4.
12. Aderibigbe SA, Agaja SR, Bamidele JO.Determinants of utilization of traditional bone setters in Ilorin, north central NigeriaJPrev Med Hyg. 2013 Mar;54(1):35-40.
13. Omololu AB1, Ogunlade SO, Gopaldasani VK. The practice of traditional bonesetting: training algorithm.ClinOrthopRelat Res. 2008 Oct;466(10):2392-8. doi: 10.1007/s11999-008-0371-Epub 2008 Jul 9

14. Dada A1, Giwa SO, Yinusa W, Ugbeye M, Gbadegesin S.Complications of treatment of musculoskeletal injuries by bone setters. .West Afr J Med. 2009 Jan;28(1):43-7.
15. Ariës MJ1, Joosten H, Wegdam HH, van der Geest S. Fracture treatment by bonesetters in central Ghana: patients explain their choices and experiences... Trop Med Int Health. 2007 Apr;12 (4):564-74.
16. Eze KC. Complications and co-morbidities in radiographs of patients in traditional bone setters' homes in Ogwa, Edo State, Nigeria: a community-based study.Eur JRadiol. 2012 Sep; 81(9): 2323 -8. doi: 10.1016/j.ejrad.2011.06.030. Epub 2011 Jul 5.
17. Dada AA1, Yinusa W, Giwa SO. Review of the practice of traditional bone setting in Nigeria.Afr Health Sci. 2011 Jun;11(2):262-5
18. OlaOlorun DA, Oladiran IO, Adeniran A.Complications of fracture treatment by traditional bonesetters in southwest Nigeria.FamPract. 2001 Dec;18(6):635-7.
19. Jain AK, Kumar S. Neglected musculoskeletal injuries.1st edition. 2011 aypee brothers New delhi ISBN 978-81-8448-889-0 chapter 3 Kumar S, Gulati D.pg 29-44
20. Danis R. Theorieetpratique de l'osteosynthese. Paris, Masson, 1949

21. Pauwels F. GrundrisseinerBiomechanik der Frakturheilung Verh Dtsch OrthopGes 1940;34:62.
22. Heppenstall RB. Fracture treatment and healing. Philadelphia, WB Saunders,1980.
23. Einhorn TA. The cell and molecular biology of fracture healing.Clin OrthopRelat Res 1998;Suppl 355: S7-S21.
24. Rock MG. Myositis ossificans. Textbook of orthopedics and trauma 1st edition. Oxford. Pg 144-50
25. erring JA. Myositis ossificans.Tachdijian'sPaediatric orthopedics. Saunder's 4theditionpgs 1668-69
26. Mubarak SJ, Hargens AR. Compartment syndromes and Volkmann's contracture. Philadelphia, WB Saunders, 1981.
27. Jain AK, Kumar S. Neglected musculoskeletal injuries.1st edition.2011 aypee brothers Newdelhi. Kumar S, Gulati D.pg 93-123. Chapter 7 Compartment syndrome and Volkmann's ischemic contracture ISBN 978-81-8448-889-0
28. DeLee JC, Stiehl JB. Open tibia fracture with compartment syndrome. ClinOrthopRelat Res 1981; 175-84.
29. Blick SS, Brumback RJ, Poka A, Burgess AR, Ebraheim NA. Compartment syndrome in open tibial fractures. J Bone Joint Surg Br 1996;78:99-104

30. Maheshwar L , Kiran K K , Vamshi KC , Siva Prasad R. Volkmann's Ischemic Contracture with Atrophic Non-union ofUlna Managed by Bone Shortening and Transposition ofRadial Autograft. Journal of Orthopaedic Case Reports 2015 Jan-March: 5(1):Page 65-68.
31. Hawkins RJ, Neer CS 2nd, Pianta RM, Mendoza FX. Locked posterior dislocationof the shoulder. J Bone Joint Surg [Am] 1987;69-A:9-18
32. Aparicio G, Calvo E, Bonilla L, Espejo L, Box R. Neglected traumatic posterior dislocations of the shoulder: controversies on indications for treatment and new CT scan findings. J OrthopSci 2000;5:37-42.
33. Krøner K1, Lind T, Jensen J. The epidemiology of shoulder dislocations.ArchOrthop Trauma Surg. 1989;108(5):288-90.
34. Court-brown CM, Heckman JD, McQueen MM, Ricci WM, Tornetta P. Rockwood and Green's Fracture in adults. 8th edition.Wolters Kluwer China 2015.chapter 40 glenohumeral instability JawaARichetti ET pg 1503-72.
35. Rowe CR, Zarins B. Chronic unreduced dislocations of the shoulder J Bone Joint Surg Am. 1982 Apr;64(4):494-505.
36. Namdari S1, Yagnik G, Ebaugh DD, Nagda S, Ramsey ML, Williams GR Jr, Mehta S. Defining functional shoulder range of

motion for activities of daily living.J Shoulder Elbow Surg. 2012 Sep;21(9):1177-83. doi: 10.1016/j.jse.2011.07.032. Epub 2011 Nov 1.

37. Shah K, Ubale T, Ugrappa H, Pilankar S, Bhaskar A, Kale S.Neglected Anterior Dislocation of Shoulder: is surgery necessary? A Rare Case with review of literature.J Orthop Case Rep. 2015 Oct-Dec;5(4):61-3. doi: 10.13107/jocr.2250-0685.348
38. N. D Chatterjee, KausikChakraborty, D. P Baksi. Open Reduction Of Old Neglected Dislocation Of Shoulder (Long Term follow up results)Indian journal of orthopedics.1999;33(3):204-8
39. Goga IE.Chronic shoulder dislocations.J Shoulder Elbow Surg. 2003 Sep-Oct;12(5):446-50.
40. Mansat P, Guity MR, Mansat M, Bellumore Y, Rongières M, Bonnevialle P.Chronic anterior shoulder dislocation treated by open reduction sparing the humeral head. Rev ChirOrthop Reparatrice Appar Mot. 2003 Feb;89(1):19-26.
41. Abdelhady AM. Neglected anterior shoulder dislocation: Open remplissage of the Hill-Sachs lesion with the infraspinatus tendon. ActaOrthop. Belg., 2010, 76, 162-165
42. Chaudhary D, et al., A six months old neglected anterior shoulder dislocation managed by closed reduction andLatarjet procedure, Chinese Journal of Traumatology (2016), http://dx.doi.org/

10.1016/j.cjtee.2016.06.005

43. Rouhani A, NavaliAM. Treatment of chronic anterior shoulder dislocation by open reduction and simultaneous Bankart lesion repair.Sports Med ArthroscRehabilTher Technol. 2010; 2: 15.Published online 2010 Jun 16.doi: 10.1186/1758-2555-2-15

44. Jain AK, Kumar S. Neglected musculoskeletal injuries.1st edition.2011 aypee brothers New delhi ISBN 978-81-8448-889-0 chapter 22 Chen NC, Jupiter J.pg 301-18

45. Ring D, Jupiter JB: Fracture –dislocation of the elbow. J Bone Joint Surg 1998;80A:566-80

46. O'Driscoll SW: Classification and Evaluation of Recurrent instability of the elbow. ClinOrthopRelat Res 2000;370:34-43.

47. Morrey BF. The posttraumatic stiff elbow.ClinOrthopRelat Res. 2005 Feb;(431):26-35.

48. Mahaisavariya B, Laupattarakasem W: Neglected dislocation of elbow. ClinOrthoprelat res 2005;431:21-5

49. Nicola L, Birhanu A, Aselefech G, Giovanni M.Outcome of open reduction for the neglected posterior dislocation of the elbow in a low-to-middle income country.TropDoct. 2016 Apr;46(2):96-100. doi: 10.1177/0049475515598465. Epub 2015 Aug 6.

50. Kanakaraddi S. Primary total elbow replacement in a patient with old unreduced complex posterior elbow dislocation Bull HospJt

Dis (2013). 2013;71(4):294-6.

51. Kapukaya A, Ucar BY, Gem M. Open reduction and Kirschner wire fixation with triceps lengthening for neglected elbow dislocations.JOrthopSurg (Hong Kong). 2013 Aug;21(2):178-81.

52. Islam S, Jahangir J, Manzur RM, Chowdury AA, Tripura N, das A. Management of neglected elbow dislocations in a setting with low clinical resources.Orthop Surg. 2012 Aug;4(3):177-81. doi: 10.1111/j.1757-7861.2012.00190.x.

53. Bansal P, Lal H, Khare R, Mittal D.Treatment of neglected elbow dislocations with combination of speed V-Y muscleplasty and intra-articular injection of hydrocorticosone. Kathmandu Univ Med J (KUMJ). 2010 Jan-Mar;8(29):91-4.

54. Coulibaly NF, Tiemdjo H, Sane AD, Sarr YF, Ndiaye A, Seye S. Posterior approach for surgical treatment of neglected elbow dislocation.OrthopTraumatolSurg Res. 2012 Sep;98(5):552-8. doi: 10.1016/j.otsr.2012.03.006. Epub 2012 Aug

55. Nana AD, Joshi A, Lichtman DM. Plating of the distal radius. J Am AcadOrthopSurg 2005;13(3): 159-71

56. Lodha SJ, Wysocki RW, Cohen MS. Malunion of distal radius.American society for surgery of the hand.P 125 – 37.

57. Anderson DD, Deshpande BR, Daniel TE, Baratz ME. A three dimensional finite element model of the radio carpal joint: distal

radius fracture step-off and stress transfer. Iowa Orthop J. 2005;25:108-17

58. Ryu JY, Cooney WP 3rd, Askew LJ, An KN, Chao EY. Functional ranges of motion of the wrist joint. J Hand Surg Am. 1991 May;16(3):409-19.

59. Trumble TE, Schmitt SR, Vedder NB.Factors affecting functional outcome of displaced intra-articular distal radius fractures.J Hand Surg Am. 1994 Mar;19(2):325-40.

60. Ring D, Prommersberger KJ, Juan González del Pino, Miguel Capomassi, Miguel Slullitel, Jupiter JB. Corrective Osteotomy for Intra-Articular Malunion of the Distal Part of the Radius. J Bone Joint Surg Am, 2005 Jul; 87 (7): 1503 -1509 . http://dx.doi.org/10.2106/JBJS.D.02465

61. Hegeman JH, Oskam J, Vierhout PA, Ten Duis HJ.External fixation for unstable intra-articular distal radial fractures in women older than 55 years. Acceptable functional end results in the majority of the patients despite significant secondary displacement.injury. 2005 Feb;36(2):339-44.

62. Kreder HJ, Hanel DP, Agel J, McKee M, Schemitsch EH, Trumble TE, Stephen D. Indirect reduction and percutaneous fixation versus open reduction and internal fixation for displaced intra-articular fractures of the distal radius: a randomised, controlled trial.J Bone

Joint Surg Br. 2005 Jun;87(6):829-36.

63. AsgharElmi, Ali Tabrizi, Alireza Rouhani, Fardin Mirzatolouei. Treatment of neglected malunion of the distal radius: a cases series study. Med J Islam Repub Iran.2014; 28: 7.

64. Garg B, Goyal T, Kotwal PP.Staged reduction of neglected transscaphoid perilunate fracture dislocation: a report of 16 cases.J OrthopSurg Res. 2012 May 20;7:19. doi: 10.1186/1749-799 X-7-19.

65. Hitesh Lal, VivekJangira, Rahul Kakran,Deepak Mittal. Two stage procedure for neglected transscaphoidperilunate dislocation. Indian J Orthop. 2012 May-Jun; 46(3): 351–355.

66. Upadhyay SS, Moulton A, Srikrishnamurthy K.An analysis of the late effects of traumatic posterior dislocation of the hip without fractures.J Bone Joint Surg Br. 1983 Mar;65(2):150-2.

67. P. Kouyoumdjian, R. Coulomb, T. Sanchez, G. Asencio. Clinical evaluation of hip joint rotation range of motion in adults. Orthopaedics& Traumatology: Surgery & Research (2012) 98, 17—23

68. Gupta RC, Shravat BP.Reduction of neglected traumatic dislocation of the hip by heavy traction. J Bone Joint Surg Am. 1977 Mar;59(2):249-51.

69. Garrett JC, Epstein HC, Harris WH, Harvey JP Jr, Nickel VL.Treatment of unreduced traumatic posterior dislocations of the hip. J Bone Joint Surg Am. 1979 Jan;61(1):2-6.

70. Oni OO, Orhewere FA, Keswani H.The treatment of old unreduced traumatic dislocations of the hip.Injury. 1984 Jan;15(4):219-23.

71. Varma BP. Management of old unreduced traumatic dislocation of hip. Indian journal of orthopedics. 1975 Dec;9(2):69-80

72. Kim YH1, Oh JH, Koh YG. Salvage of neglected unstable intertrochanteric fracture with cementless porous-coated hemiarthroplasty .ClinOrthopRelat Res. 1992 Apr;(277):182-7.

73. Kanna GR, Uvaraj NR, Sriram K. Nonunion Of Intertrochanteric Fractures Of Femur. Indian journal of orthopedics 1997;31(4): 256-60

74. Magu NK, Rajesh Rohilla, RoopSingh,Rochak Tater.Modified Pauwels' Intertrochanteric Osteotomy in Neglected Femoral Neck Fracture.ClinOrthopRelat Res. 2009 Apr; 467(4): 1064–1073. . doi: 10.1007/s11999-008-0695-4

75. Dasheng Lin, ShenjiaZuo, Lin Li, Lei Wang, and KejianLian. Treatment of neglected femoral neck fractures using the modified dynamic hip screw with autogenous bone and bone morphogenetic protein-2 composite materials grafting.Indian J Orthop. 2015 May-Jun; 49(3): 342–346.

76. Gurvinder Singh Kainth, Yuvarajan P, LalitMaini, Vinod Kumar. Neglected femoral neck fractures in adults. Journal of Orthopaedic Surgery 2011;19(1):13-7

77. Kapoor A, Deety LV, John VZ, Devadoss S, Devadoss A.. Management of neglected femoral neck fractures and nonunions using a novel triple surgery combination: an Indian experience.Int J Low Extrem Wounds. 2012 Mar;11(1):49-58. doi: 10.1177/1534734612438056. Epub 2012 Feb 14.

78. Huang, Chun-Hsiung. Treatment of Neglected Femoral Neck Fractures in Young Adults.Clinical Orthopaedics& Related Research.1986.

79. MukeshKalra · SanjeevAnand. Valgus intertrochanteric osteotomy for neglected femoral neck fractures in young adults. . International Orthopaedics (SICOT) (2001) 25:363–366.DOI 10.1007/s002640100288.

80. Saini R, Mootha AK, Goni VG, Dhillon MS. Neglected irreducible posterolateral knee dislocation.Indian J Orthop. 2010 Oct-Dec; 44(4): 468-70.doi: 10.4103/0019-5413.69323

81. Jain AK, Kumar S. Neglected musculoskeletal injuries.1st edition.2011 aypee brothers New delhi ISBN 978-81-8448-889-0

82. Khamaisy S, HaleembAM,Williams RJ, Rozbruch SR. Neglected rotatory knee dislocation: A case report.The Knee 21 (2014)

975–978

83. Anand, Bellad SH, Raghavendra MS. Corrective Surgery for MalunitedTibial Plateau Fracture. IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 14, Issue 11 Ver. I (Nov. 2015), PP 19-22 www.iosrjournals.org DOI: 10.9790/0853-141111922

84. Henshaw RM Shapiro MS MatthewS.Oppenheim, WilliamL. Delayed Reduction of Traumatic Knee Dislocation: A Case Report and Literature Review.ClinicalOrthopaedics& Related Research: Knee.1996(sep);330:152-6

85. Thomas Matthai,KaushikBhowmick,P. R. J. V. C. Boopalan James C. George. Neglected Anterior Dislocation of the Knee with Common Peroneal Palsy.Case Reports in Orthopedics Volume 2015 (2015), Article ID 174965, 3 pageshttp:// dx.doi.org /10.1155/ 2015/174965

86. Karn NK, Khanal GP, Singh MP.Long-standing unreduced anterior dislocation of the knee - a case report.Internet Journal of Medical Update 2010 January;5(1):51-53

87. Vicente-Guillen P, Figa-Mataró J, Coloma-Bellver J. Long-standing unreduced dislocation of the knee.A case report.Orthop. 1998;22(4):275-6.

88. Raj N, Ram S, Kumar S. Neglected Intra-articular Proximal Tibia Fracture : Good Functional Outcome After Operative Stabilisation. Webmed Central Orthopedics 2010;1(12):WMC001430 doi: 10.9754/journal.wmc.2010.001430

89. Hsin-Chang Chen, Fang-Yao Chiu. Chronic knee dislocation treated with arthroplasty. Injury Extra (2007) 38, 258—261

90. Devgan A, Kamboj P, Gupta V, Magu NK, Rohilla R. Pseudoarthrosis of medial tibial plateau fracture-role of alignment procedure. Chin J Traumatol. 2013;16(2):118-21.

91. Jiang Y, Wang Z, Zhang D, Gu G. twenty seven year nonunion of a Hoffa fracture in a 46 year old patient. ChinJ Traumatol. 2015;(18): 54-58.

92. Jain AK, Kumar S. Neglected musculoskeletal injuries.1st edition.2011 aypee brothers New delhi ISBN 978-81-8448-889-0

93. JamesSammarco.Biomechanics of the ankle: I. Surface velocity and instant center of rotation in the sagittal plane Am J Sports Med December 1977 5 231-234; doi:10.1177/036354657700500603

94. Mostafa M, Ali HM. Surgical treatment of neglected ankle fracture dislocation: Mid term Follow up. Pan Arab J.Orth. Trauma. 2001;5(2).

95. Tellisi N, Deland JT, Rozbruch SR. Gradual Reduction of Chronic Fracture Dislocation of the Ankle Using Ilizarov/Taylor Spatial

Frame. HSSJ (2011) 7: 85–88.DOI 10.1007/s11420-010-9166-z

96. Khan WS, Malik AA, Agarwal M, Dalal R. Delayed open reduction and internal fixation of a neglected fracture dislocation of the ankle. Int J ClinPract. 2007 Apr;61(4):594-5.

97. Saied A, Ziayie A. Neglected ankle dislocation.J Foot Ankle Surg. 2007 Jul-Aug;46(4):307-9.

98. Goyal A, Kumar S.Tibiotalar Arthrodesis in Neglected and Infected Fracture Dislocation of the Ankle: A Case Report. International Journal of Healthcare Sciences ISSN 2348-5728 (Online) Vol. 3, Issue 1, pp: (87-91),

99. Chiu FY, Wong CY, Lo WH Surgery for old ankle fracture. 13 cases followed for 9 (5-15) yearsActaOrthopScand 1994 Aug; 65 (4): 394-7.

100. Cheng YM, Huang PJ, Chen SK, Tien YC, Lin SY, Chen LH, Chiang SC. Salvage operation for neglected ankle fractures Kaohsiung J Med Sci. 1997 Oct;13(10):618-25.

101. Fahsi M Benameur H Hiba O Abouchane M neglected dislocation of the elbow: About 8 cases and review of literature. Open access Library journal.2015;2:e2066.

ANNEXURE

SHOULDER CASE 11 S

4 months neglected shoulder dislocation

Immediate post op X ray

At 6 month post op

SHOULDER CASE 9 S

3 month neglected anterior dislocation of shoulder

Pre op X ray and CT scan

immediate post op xray

at 1 month follow with septic Arthritis

ELBOW CASE 9 E


2 months neglected posterior elbow dislocation

Post op X ray

6 month post op

ELBOW CASE 7 E



Neglected posterolateral dislocation of elbow with medial malleolus fracture

---



6 month post op

On CPM


HIP CASE 2H

Neglected neck of femur fracture in a 15 year old female

Pre op X ray

Immediate post op

6 month post op

After 6 month post op

HIP CASE 96H

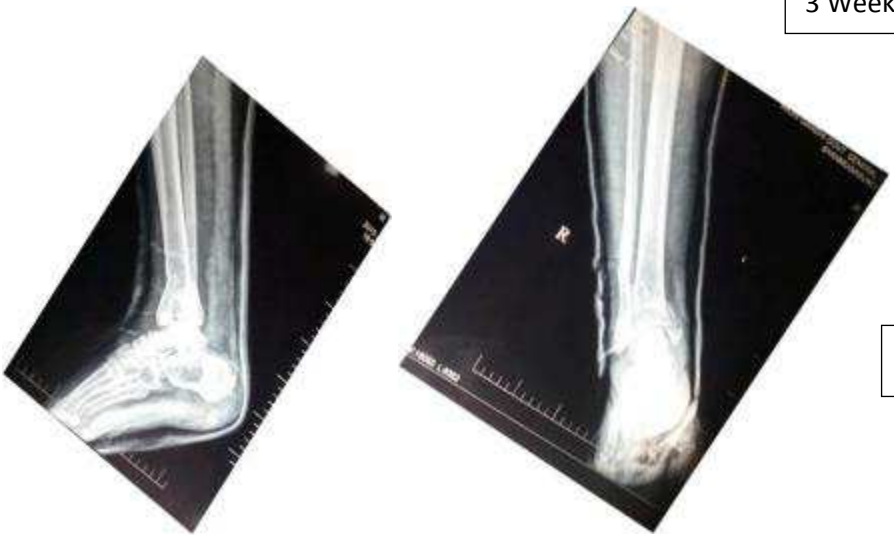
Neglected anterior dislocation of hip

Pre op

Post op

ANKLE CASE 13A

3 Weeks Neglected trimalleolar



Pre op X ray

6 months post op

ANKLE CASE 2A

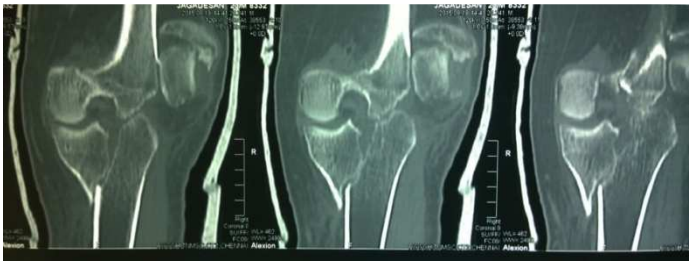
144 weeks Neglected trimalleolar fracture with talus fracture

---

6 month post op ankle arthrodesis with intramedullary nail

KNEE CASE 11K

Pre op X ray



CT scan

Post op Xray

WRIST CASE 2W

Neglected distal radius with ulnar styloid fracture

Post op- Darrach's procedure done

WRIST CASE 7W

Pre op neglected Galeazzi fracture

Postop X ray

CASE PROFORMA

NAME :

AGE/SEX :

OCCUPATION:

ADDRESS :

Contact Number:

Date of Injury :

Date of Admission :

Date of Surgery :

History of Neglect:

Mode of Native Treatment:

DIAGNOSIS :

COMPLAINTS :

MODE OF INJURY :

CLINICAL EXAMINATION :

PRE OP FUNCTIONAL RANGE OF MOVEMENT

X RAY :

IMPLANTS USED :

POSTOP X RAY :

POSTOP FUNCTIONAL RANGE OF MOVEMENT

COMPLICATIONS :

FOLLOW UP :

1 st WEEK POSTOP :

6 MONTHS POSTOP :

1 YEAR POSTOP :

RADIOLOGICAL ASSESSMENT:

INFORMATION SHEET

Principle Investigator Name :

Participant Name :

We are conducting a study on **"OUTCOME ANALYSIS OF NEGLECTED MUSCULOSKELETAL INJURIES"** among patients attending the Institute of Orthopaedics& Traumatology, Rajiv Gandhi Government General Hospital, Chennai and for that your specimen may be valuable to us.

The purpose of this study is to evaluate and analyse the clinical, radiological, functional. We are selecting certain cases and if you are found eligible, we may be using your radiographs, blood samples, MRI toevaluate the outcome of the treatment which in any way do not affect your final report or management.

All the procedures are free of cost and there will not be any side effects.

The privacy of the patients in the research will be maintained throughout the study. In the event of any publication or presentation resulting from the research, no personally identifiable information will be shared.

Taking part in this study is voluntary. You are free to decide whether to participate in this study or to withdraw at any time; your decision will not result in any loss of benefits to which you are otherwise entitled.

The results of the special study may be intimated to you at the end of the study period or during the study if anything is found abnormal which may aid in the management or treatment.

Signature of Investigator | Signature of Participant

Date :
Place :

ஆராய்ச்சி தகவல் தாள்

சென்னை ராஜீவ் காந்தி அரசு பொது மருத்துவமனைக்கு வரும் நோயாளிகளில் புறக்கணிக்கப்பட்ட தசைக்கூட்டு காயங்களின் விளைவு பகுப்பாய்வு.

நீங்களும் இந்த ஆராய்ச்சியில் பங்கேற்க நாங்கள் விரும்புகிறோம். அதனால் தங்களது நோயின் ஆய்வறிக்கையோ அல்லது சிகிச்சையோ பாதிப்பு ஏற்படாது என்பதையும் தெரிவித்துக்கொள்கிறோம்.

முடிவுகளை அல்லது கருத்துக்களை வெளியிடும்போதோ அல்லது ஆராய்ச்சியின்போதோ தங்களது பெயரையோ அல்லது அடையாளங்களையோ வெளியிட மாட்டோம் என்பதை தெரிவித்துக்கொள்கிறோம்.

இந்த ஆராய்ச்சியில் பங்கேற்பது தங்களுடைய விருப்பத்தின்பேரில்தான் இருக்கிறது. மேலும் நீங்கள் எந்த நேரமும் இந்த ஆராய்ச்சியிலிருந்து பின்வாங்கலாம் என்பதையும் தெரிவித்துக்கொள்கிறோம்.

இந்த சிறப்பு பரிசோதனைகளின் முடிவுகளையும் நோயின் தன்மை பற்றியும் ஆராய்ச்சியின்போது அல்லது ஆராய்ச்சியின் முடிவின்போது தங்களுக்கு அறிவிப்போம் என்பதையும் தெரிவித்துக்கொள்கிறோம்.

ஆராய்ச்சியாளர் கையொப்பம் **பங்கேற்பாளர் கையொப்பம்**

நோயாளியின் உறவினர்/ காப்பாளர் கையொப்பம்

PATIENT CONSENT FORM

Study Detail	:	**"OUTCOME ANALYSIS OF NEGLECTED MUSCULOSKELETAL INJURIES"**
Study Centre	:	Rajiv Gandhi Government General Hospital, Chennai.
Patient's Name	:	
Patient's Age	:	
Identification Number	:	

Patient may check (√) these boxes

a) I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask question and all my questions and doubts have been answered to my complete satisfaction. ❑

b) I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving reason, without my legal rights being affected. ❑

c) I understand that sponsor of the clinical study, others working on the sponsor's behalf, the ethical committee and the regulatory authorities will not need my permission to look at my health records, both in respect of current study and any further research that may be conducted in relation to it, even if I withdraw from the study I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from this study. ❑

d) I agree to take part in the above study and to comply with ❑

the instructions given during the study and faithfully cooperate with the study team and to immediately inform the study staff if I suffer from any deterioration in my health or well being or any unexpected or unusual symptoms.

e) I hereby consent to participate in this study. ❑

f) I hereby give permission to undergo detailed clinical examination, Radiographs & blood investigations as required. ❑

Signature/thumb impression	Signature of Investigator
Patient's Name and Address:	Study Investigator's Name: **Dr.K.M.SIVAPRASAD**

ஆய்வு பற்றிய சுய ஒப்புதல் படிவம்

ஆய்வின் தலைப்பு

புறக்கணிக்கப்பட்ட தசைக்கூட்டு காயங்களின் விளைவு பகுப்பாய்வு

ஆய்வு நிலையம் : சென்னை மருத்துவக் கல்லூரி மற்றும்
ராஜீவ் காந்தி அரசு பொது மருத்துவமனை,
சென்னை - 3.

பங்கு பெறுவரின் பெயர் : உறவுமுறை:

பங்குபெறுபவரின் எண் :

பங்குபெறுபவர் இதனை (✓) குறிக்கவும்

மேலே குறிப்பிட்டுள்ள மருத்துவ ஆய்வின் விவரங்கள் எனக்கு விளக்கப்பட்டது. என்னுடைய சந்தேகங்களை கேட்கவும், அதற்கான தகுந்த விளக்கங்களை பெறவும் வாய்ப்பளிக்கப்பட்டது. ☐

நான் இவ்வாய்வில் தன்னிச்சையாகதான் பங்கேற்கிறேன். எந்த காரணத்தினாலோ எந்த கட்டத்திலும் எந்த சட்ட சிக்கலுக்கும் உட்படாமல் நான் இவ்வாய்வில் இருந்து விலகி கொள்ளலாம் என்றும் அறிந்து கொண்டேன். ☐

இந்த ஆய்வு சம்பந்தமாகவோ, இதை சார்ந்த மேலும் ஆய்வு மேற்கொள்ளும் போதும் இந்த ஆய்வில் பங்குபெறும் மருத்துவர் என்னுடைய மருத்துவ அறிக்கைகளை பார்ப்பதற்கு என் அனுமதி தேவையில்லை என அறிந்து கொள்கிறேன். நான் ஆய்வில் இருந்து விலகிக் கொண்டாலும் இது பொருந்தும் என அறிகிறேன். ☐

இந்த ஆய்வின் மூலம் கிடைக்கும் தகவல்களையும், பரிசோதனை முடிவுகளையும் மற்றும் சிகிச்சை தொடர்பான தகவல்களையும் மருத்துவர் மேற்கொள்ளும் ஆய்வில் பயன்படுத்திக்கொள்ளவும் அதை பிரசுரிக்கவும் என் முழு மனதுடன் சம்மதிக்கின்றேன். ☐

இந்த ஆய்வில் பங்கு கொள்ள ஒப்புக்கொள்கிறேன். எனக்கு கொடுக்கப்பட்ட அறிவுரைகளின்படி நடந்து கொள்வதுடன், இந்த ஆய்வை மேற்கொள்ளும் மருத்துவ அணிக்கு உண்மையுடன் இருப்பேன் என்று உறுதியளிக்கிறேன். ☐

இந்த ஆய்வில் எனக்கு மருத்துவபரிசோதனை, இரத்தப் பரிசோதனை, சிறுநீர் பரிசோதனை, ஊடுகதிர்படம், இதய மின்துடிப்பு வரைவி மற்றும் நுண்கதிர் வயிறு பரிசோதனை செய்து கொள்ள முழு மனதுடன் நான் சம்மதிக்கிறேன். ☐

பங்கேற்பவரின் கையொப்பம் ..... இடம்..... தேதி.....

கட்டைவிரல் ரேகை:

நோயாளியின் உறவினர்/ காப்பாளர் கையொப்பம் ..... இடம்..... தேதி.....

பங்கேற்பவரின் பெயர் மற்றும் விலாசம் .....

ஆய்வாளரின் கையொப்பம் ..... இடம்..... தேதி.....

ஆய்வாளரின் பெயர் .....

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI 600 003

EC Reg.No.ECR/270/Inst./TN/2013
Telephone No.044 25305301
Fax: 011 25363970

CERTIFICATE OF APPROVAL

To
Dr.K.M.Sivaprasad
Post Graduate in M.S. Orthopaedic Surgery
Madras Medical College
Chennai 600 003

Dear Dr.K.M.Sivaprasad,

The Institutional Ethics Committee has considered your request and approved your study titled **"OUTCOME ANALYSIS OF FRACTURE MANAGEMENT OF NEGLECTED MUSCULOSKELETAL INJURIES"- NO. 16042016.**

The following members of Ethics Committee were present in the meeting hold on **05.04.2016** conducted at Madras Medical College, Chennai 3

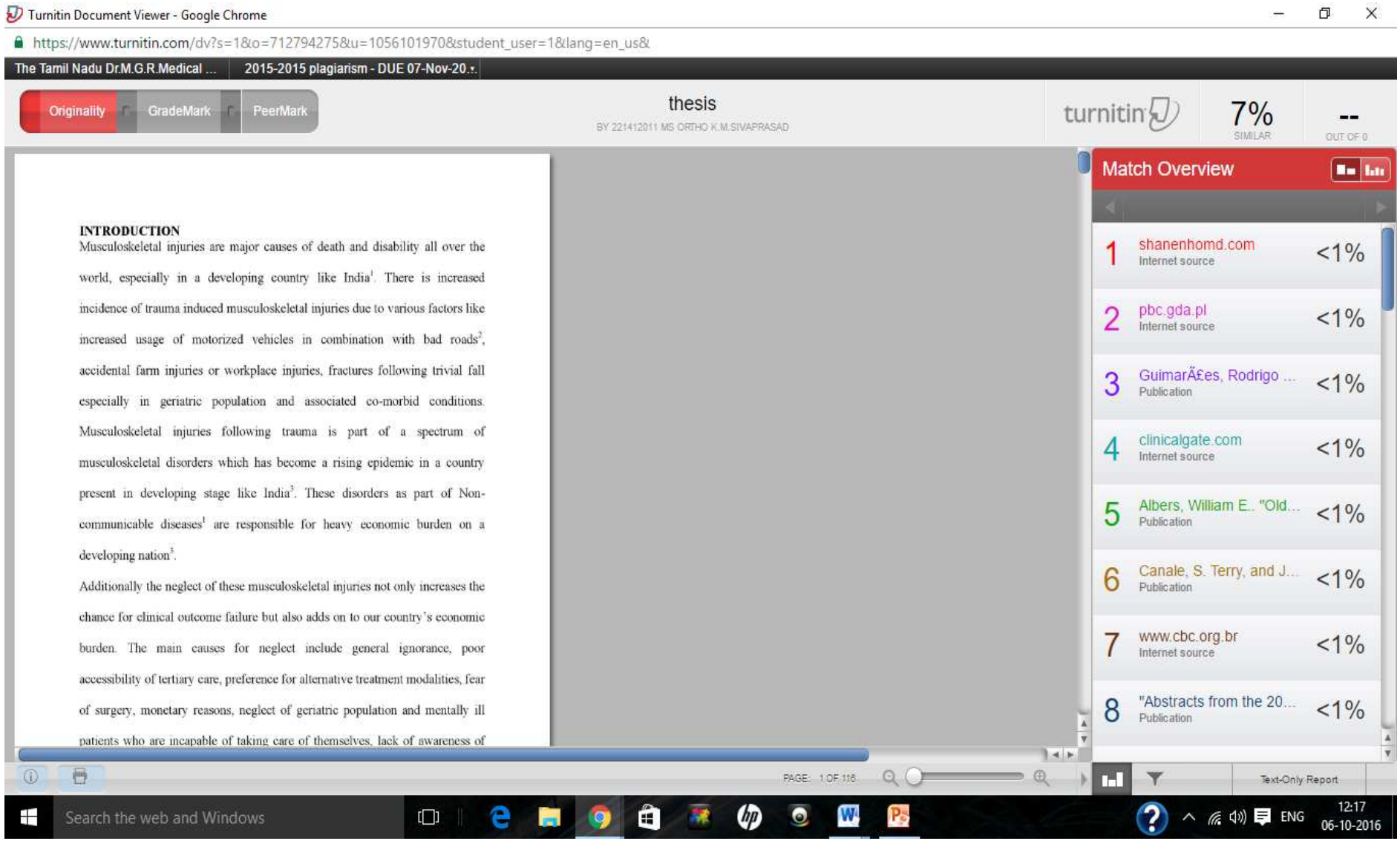
1.Dr.C.Rajendran, MD.,	:Chairperson
2.Dr.Isaac Christian Moses,MD.Ph.D.Dean(FAC)MMC,Ch-3	:Deputy Chairperson
3.Prof.Sudha Seshayyan,MD., Vice Principal,MMC,Ch-3	: Member Secretary
4.Prof.B.Vasanthi,MD., Prof.of Pharmacology.,MMC,Ch-3	: Member
5.Prof.P.Raghumani,MS, Prof. of Surgery,RGGGH,Ch-3	: Member
6. Prof.Md.Ali,MD.,DM.,HOD-MGE, MMC,Ch-3	: Member
7.Prof.Baby Vasumathi, Director, Inst. of O&G,Ch-8	: Member
8.Prof.K.Ramadevi,MD, Director,Inst.of Bio-Chem,MMC,Ch-3	: Member
9.Prof.M.Saraswathi,MD.,Director, Inst.of Path,MMC,Ch-3	: Member
10.Prof.Srinivasagalu,Director,Inst.of Int.Med.,MMC,Ch-3	: Member
11.Tmt.J.Rajalakshmi, JAO,MMC, Ch-3	: Lay Person
12.Thiru S.Govindasamy, BA.,BL,High Court,Chennai	: Lawyer
13.Tmt.Arnold Saulina, MA.,MSW.,	:Social Scientist

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary – Ethics Committee

MEMBER SEC...
INSTITUTIONAL ETHICS COM...
MADRAS MEDICAL COLLEGE
CHENNAI-600 003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INTRODUCTION
Musculoskeletal injuries are major causes of death and disability all over the world, especially in a developing country like India[1]. There is increased incidence of trauma induced musculoskeletal injuries due to various factors like increased usage of motorized vehicles in combination with bad roads[2], accidental farm injuries or workplace injuries, fractures following trivial fall especially in geriatric population and associated co-morbid conditions. Musculoskeletal injuries following trauma is part of a spectrum of musculoskeletal disorders which has become a rising epidemic in a country present in developing stage like India[3]. These disorders as part of Non-communicable diseases[1] are responsible for heavy economic burden on a developing nation[3].
Additionally the neglect of these musculoskeletal injuries not only increases the chance for clinical outcome failure but also adds on to our country's economic burden. The main causes for neglect include general ignorance, poor accessibility of tertiary care, preference for alternative treatment modalities, fear of surgery, monetary reasons, neglect of geriatric population and mentally ill patients who are incapable of taking care of themselves, lack of awareness of
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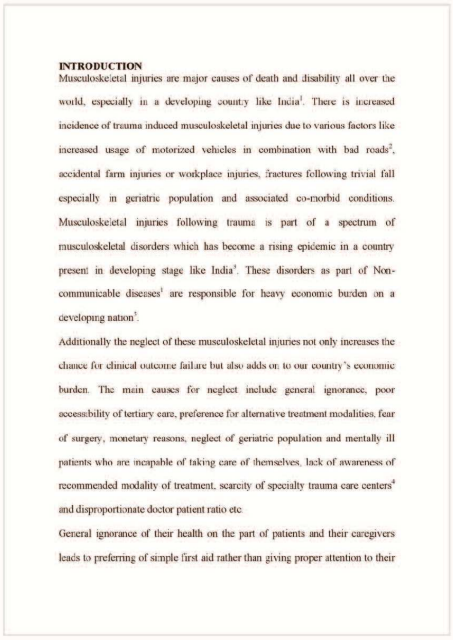

INTRODUCTION

Musculoskeletal injuries are major causes of death and disability all over the world, especially in a developing country like India[1]. There is increased incidence of trauma induced musculoskeletal injuries due to various factors like increased usage of motorized vehicles in combination with bad roads[2], accidental farm injuries or workplace injuries, fractures following trivial fall especially in geriatric population and associated co-morbid conditions. Musculoskeletal injuries following trauma is part of a spectrum of musculoskeletal disorders which has become a rising epidemic in a country present in developing stage like India[3]. These disorders as part of Non-communicable diseases[1] are responsible for heavy economic burden on a developing nation[3].

Additionally the neglect of these musculoskeletal injuries not only increases the chance for clinical outcome failure but also adds on to our country's economic burden. The main causes for neglect include general ignorance, poor accessibility of tertiary care, preference for alternative treatment modalities, fear of surgery, monetary reasons, neglect of geriatric population and mentally ill patients who are incapable of taking care of themselves, lack of awareness of recommended modality of treatment, scarcity of specialty trauma care centers[4] and disproportionate doctor patient ratio etc

General ignorance of their health on the part of patients and their caregivers leads to preferring of simple first aid rather than giving proper attention to their

MASTER CHART

MASTER SHEET SHOULDER

Case.No.	IP NO	Age/ Gender	Area of residence	Cause of neglect	Diagnosis / duration of neglect	Pre procedure VAS	Procedure done	Post procedure VAS	Functional score
1S	81667	23/M	Urban	Native treatment	Right shoulder dislocation / 12 weeks	7	Open reduction and humeroglenoid K wire fixation	2	Good (85)
2S	81726	60/F	Urban	Native treatment	Anterior dislocation left shoulder / 1 week	8	Closed reduction under GA	0	Excellent (90)
3S	81876	50/F	Urban	Native treatment	Anterior dislocation left shoulder / 1 week	8	Closed reduction under GA	0	Excellent (90)
4S	82758	58/F	Urban	Native treatment	Dislocation right shoulder with greater tuberosity fracture / 2 weeks	9	Open reduction with capsulolabral repair	0	Excellent (90)
5S	82345	60/M	Rural	Native treatment	Surgical neck of humerus fracture / 1 week	9	Open reduction internal fixation with proximal humerus locking plate	0	Excellent (90)
6S	82567	46/F	Urban	Native treatment	Greater tuberosity fracture right side / 2 weeks	8	Immobilization with ‘U’ slab	1	Good (85)
7S	82876	35/M	Rural	Native treatment	Anterior dislocation of right shoulder with greater tuberosity fracture / 12 weeks	7	Open reduction internal fixation with corocoid osteotomy and K wire fixation.	3	Fair (65)
8S	82975	28/M	Urban	Native treatment	Anterior dislocation right shoulder / 4 weeks	7	Open reduction and humeroglenoid K wire fixation	1	Good (85)
9S	83432	54/F	Rural	Native treatment	Greater tuberosity fracture right humerus / 24 weeks	7	Conservative with cuff and collar support and physical therapy	3	Fair (60)
10S	83675	60/F	Urban	Native treatment	Post traumatic stiffness right shoulder with greater tuberosity fracture / 10 weeks	7	Shoulder mobilization exercise	2	Good (80)
11S	83210	55/M	Rural	Native treatment	Anterior dislocation left shoulder / 1 week	9	Open reduction and internal fixation with humeroglenoid K wire and Latarjet procedure	0	Excellent (90)

MASTER SHEET ELBOW JOINT

Case.No.	IP NO	Age/ Gender	Area of residence	Cause of neglect	Diagnosis / duration of neglect	Pre procedure VAS	Procedure done	Post procedure VAS	Functional score
1E	84532	25/M	Rural	Native treatment	Posterior dislocation Left elbow / 12 weeks	7	Triceps V-Y plasty Open reduction and ulnohumeral K wire fixation	0	Excellent (95)
2E	84120	30/M	Rural	Native treatment	Posterior dislocation left elbow / 10 weeks	8	Open reduction and ulno humeral and radio capitellar K wire fixation	2	Good (85)
3E	84539	35/M	Rural	Native treatment	Supracondylar fracture humerus left side / 24 weeks	8	Triceps V-Y plasty Open reduction and internal fixation with Bicolumn plating	2	Good (80)
4E	84502	16/M	Rural	Native treatment	Supracondylar fracture humerus right side / 32 weeks	6	Triceps V-Y plasty Open reduction and internal fixation with Bicolumn plating	2	Good (85)
5E	85662	15/M	Rural	Native treatment	Lateral condyle humerus left side / 12 weeks	9	Open reduction and internal fixation with Buttress plate.	1	Good (85)
6E	87389	14/M	Rural	Native treatment	Distal humerus fracture right side with intercondylar extension / 16 weeks	8	Chevron osteotomy for olecranon. Open reduction and internal fixation with Bicolumn plating	1	Good (85)
7E	8765487690	14/F	Urban	Native treatment	Posterior dislocation of left elbow with medial epicondyle fracture / 4 weeks	9	Triceps V-Y plasty Open reduction of elbow joint and screw fixation for medial malleolus and Ulnar nerve neurolysis and anterior transposition	0	Excellent (95)
8E	87990	60/F	Rural	Native treatment	Supracondylar fracture humerus left side / 48 weeks	6	Open reduction and internal fixation with lateral column plate and screw for medial condylar fragment.	3	Fair (65)
9E	88932	15/M	Urban	Native treatment	Posterior dislocation of left elbow / 3 weeks	9	Closed reduction and percutaneous ulnohumeral K wire	0	Excellent (95)

10E	88567	47/M	Rural	Native treatment	Fracture radial head left side / 40 weeks	6	Radial head excision	0	Excellent (90)
11E	88000	42/M	Urban	Native treatment	Proximal ulna fracture with radial head dislocation / 16 weeks	7	Radial head excision open reduction and internal fixation with Recon plating for ulna	1	Good (85)
12E	89232	23/F	Rural	Native treatment	Lateral condyle fracture humerus with tardy ulnar nerve palsy right side / 15 weeks	7	Open reduction and internal fixation of lateral condyle with screw and anterior transposition of ulnar nerve	1	Good (85)
13E	89345	32/F	Rural	Native treatment	Lateral condyle fracture nonunion with radial head fracture / 8 weeks	8	Open reduction and internal fixation of lateral condyle with screw and anterior transposition of ulnar nerve	0	Excellent (95)
14E	89467	45/M	Rural	Native treatment	Right posterior dislocation of elbow / 12 weeks	8	Open reduction with internal fixation with Ulnohumeral K wire.	0	Excellent (90)
15E	89664	26/F	Rural	Native treatment	Olecranon fracture / 2 weeks	9	Modified tension band wiring with bone grafting	1	Good (80)
16E	89007	39/M	Rural	Native treatment	Terrible triad of elbow right side / 3 weeks	9	Open reduction Herbert screw fixation for radial head fracture and transosseous coronoid fracture repair with fiber wire sutures.	0	Excellent (90)

MASTER SHEET WRIST

Case.No.	IP NO	Age/ Gender	Area of residence	Cause of neglect	Diagnosis / duration of neglect	Pre procedure VAS	Procedure done	Post procedure VAS	Functional score
1W	90223	25/M	Urban	Native treatment	Fracture nonunion scaphoid with perilunate dislocation left side / 18 weeks	7	Open reduction and Herbert screw fixation with iliac bone graft for scaphoid fracture and scapholunate K wire fixation	1	Good (85)
2W	90445	60/M	Urban	Lack of caregivers(mentally challenged)	Left distal radius fracture right side / 12 weeks	7	Darrach's procedure	1	Excellent (95)
3W	91222	60/F	rural	Native treatment	Distal radius and ulna styloid fracture right side / 1 week	9	Open reduction and internal fixation with volar locking plate for radius and radioulnar K wire transfixation	3	Good (85)
4W	91456	18/M	Urban	Native treatment	Volar Barton fracture right wrist / 1 week	9	Open reduction and internal fixation with volar locking plate and bone grafting was done	2	Good (85)
5W	91789	25/M	Urban	Native treatment	Distal both bone fracture with distal radio ulnar joint disruption right side / 7 weeks	8	Open reduction and internal fixation with volar locking plate with K wire fixation for distal ulnar fracture	0	Excellent (95)
6W	91768	53/M	Rural	Native treatment	Right Galleazi fracture right side / 8 weeks	8	Open reduction and internal fixation with Asian dynamic compression plate	1	Excellent (95)
7W	92367	60/M	Urban	Native treatment	Right Galleazi fracture right side / 2 weeks	9	Open reduction and internal fixation with Asian dynamic compression plate and radio ulnar K wire fixation	1	Excellent (95)

MASTER SHEET HIP

Case.No.	IP NO	Age/	Gender	Area of residence	Duration of neglect	Cause of neglect	Diagnosis	Pre procedure VAS	Procedure done	Post procedure VAS	Functional score
1. H	100002	45	M	Rural	1 week	Not treated	Greater trochanteric fracture right femur	9	Open reduction and internal fixation with tension band wiring	1	Excellent (92)
2. H	100034	31	M	Urban	8 weeks	Native treatment	Neck of femur fracture right side	7	Dynamic hip screw fixation with valgus osteotomy	1	Excellent (94)
3. H	100015	57	M	Rural	4 weeks	Native treatment	Intertrochanteric fracture right femur	8	Open reduction and internal fixation with Dynamic hip screw fixation with bone grafting	2	Good (83)
4. H	100016	34	F	Rural	20 weeks	Native treatment	Neck of femur fracture right side	6	Bipolar hemiarthroplasty	2	Good (82)
5. H	100054	58	F	Rural	12 weeks	Native treatment	Neck of femur fracture right side	7	Total hip replacement	3	Fair (74)
6. H	100059	60	F	Urban	2 weeks	Native treatment	Left side intertrochanteric fracture femur	8	Open reduction and internal fixation with Dynamic hip screw fixation with bone grafting	2	Excellent (96)
7. H	100089	60	M	Urban	3 weeks	Lack of care givers/ mentally challenged	Left side intertrochanteric fracture femur	8	Dynamic hip screw fixation	2	Good (86)
8. H	100095	80	F	Urban	4 weeks	Native treatment	Neck of femur fracture right side	8	Bipolar hemiarthroplasty	2	Good (85)
9. H	100105	60	M	Rural	20 weeks	Native treatment	Nonunion neck of femur fracture left side	8	Total hip replacement	3	Fair (77)
10. H	100108	55	M	Urban	3 weeks	Native treatment	Left side Intertrochanteric fracture femur	9	Dynamic hip screw fixation	1	Excellent (90)

11. H	100119	57	M	Urban	2 weeks	Not treated	Left side intertrochanteric fracture femur	9	Dynamic hip screw fixation	1	Excellent (93)
12. H	100067	31	M	Urban	1 week	Not treated	Intertrochanteric fracture left femur	9	Dynamic hip screw fixation	1	Excellent (94)
13. H	100089	60	F	Urban	1 week	Not treated	Neck of femur fracture left side	9	Bipolar hemiarthroplasty	2	Good (87)
14. H	100088	50	F	Rural	12 weeks	Native treatment	Neck of femur fracture left side	7	Total hip replacement	1	Fair (74)
15. H	100056	60	F	Rural	1 week	Not treated	Neck of femur fracture right side	9	Bipolar hemiarthroplasty	1	Excellent (96)
16. H	112789	35	M	Rural	1 week	Native treatment	Neck of femur fracture right side	9	Cancellous screw fixation	3	Fair (76)
17. H	19676	51	M	Rural	1 week	Native treatment	Neck of femur fracture right side	9	Cancellous screw fixation	1	Excellent (97)
18. H	189660	35	M	Rural	2 weeks	Native treatment	Intertrochanteric fracture femur right side	9	Dynamic hip screw fixation	0	Good (84)
19. H	18759	57	F	Urban	1 week	Not treated	Neck of femur fracture right side	9	Cancellous screw fixation	0	Good (86)
20. H	18696	60	M	Urban	12 weeks	Native treatment	Left side intertrochanteric fracture femur	8	Open reduction and internal fixation with dynamic hip screw and bone grafting	2	Good (83)
21. H	19786	50	F	Rural	2 weeks	Native treatment	Left side intertrochanteric fracture femur	9	Dynamic hip screw fixation	1	Excellent (92)
22. H	19883	14	M	Rural	1 week	Not treated	Cervicotrochanteric fracture femur left side	9	Dynamic hip screw fixation	0	Excellent (94)
23. H	19792	14	M	Rural	2 weeks	Native treatment	Neck of femur fracture right side	9	Cancellous screw fixation	1	Good (81)

24. H	97686	51	M	Urban	3 weeks	Native treatment	Neck of femur fracture right side	9	Total hip replacement	1	Fair (77)
25. H	97923	44	M	Urban	12 weeks	Native treatment	Neck of femur fracture left side	7	Total hip replacement	2	Good (84)
26. H	64541	60	F	Rural	8 weeks	Native treatment	Neck of femur fracture left side	8	Bipolar hemiarthroplasty	2	Good (86)
27. H	98801	60	F	Rural	1 week	Native treatment	Neck of femur fracture left side	9	Cancellous screw fixation	1	Excellent (95)
28. H	97631	60	F	Rural	1 week	Not treated	Left side intertrochanteric fracture femur	9	Dynamic hip screw fixation	1	Excellent (94)
29. H	97932	60	F	Rural	1 week	Not treated	Neck of femur fracture left side	9	Dynamic hip screw fixation with valgus osteotomy	1	Good (87)
30. H	92739	57	M	Urban	12 weeks	Native treatment	Malunited intertrochanteric fracture femur right side	8	Conservative	3	Fair (77)
31. H	97223	55	M	Rural	1 week	Not treated	Neck of femur fracture right side	8	Cancellous screw fixation	2	Good (88)
32. H	97808	33	F	Urban	2 weeks	Native treatment	Right side intertrochanteric fracture femur	9	Dynamic hip screw fixation	1	Excellent (93)
33. H	52632	60	F	Rural	96 weeks	Native treatment	Fracture neck of femur with arthritis left hip	7	Total hip replacement	2	Good (89)
34. H	86662	60	M	Rural	1 week	Not treated	Intertrochanteric fracture femur right side	9	Dynamic hip screw fixation	1	Excellent (91)
35. H	83871	37	M	Urban	2 weeks	Native treatment	Intertrochanteric fracture femur right side	9	Dynamic hip screw fixation	1	Excellent (94)
36. H	83826	60	F	Rural	2 weeks	Native treatment	Neck of femur fracture right side	9	Bipolar hemiarthroplasty	1	Good (84)

37. H	55813	45	F	Urban	2 weeks	Native treatment	Neck of femur fracture right side	9	Dynamic hip screw fixation with valgus osteotomy	1	Good (86)
38. H	86571	46	M	Rural	1 week	Not treated	Neck of femur fracture right side	9	Cancellous screw fixation	0	Excellent (90)
39. H	67868	38	M	Rural	1 week	Not treated	Intertrochanteric fracture right side	9	Dynamic hip screw fixation	0	Excellent (93)
40. H	86753	60	F	Rural	1 week	Not treated	Intertrochanteric fracture femur right side	9	Dynamic hip screw fixation	1	Excellent (96)
41. H	97980	60	M	Rural	1 week	Not treated	Closed impacted neck of femur fracture left side	9	Total hip replacement	1	Excellent (94)
42. H	86532	60	F	Rural	1 week	Not treated	Neck of femur fracture right side	9	Dynamic hip screw fixation	3	Fair (73)
43. H	88623	60	M	Rural	1 week	Not treated	Neck of femur fracture left side	9	Cancellous screw fixation	1	Good (84)
44. H	97497	60	F	Rural	1 week	Not treated	Neck of femur fracture left side	9	Cancellous screw fixation	1	Good (83)
45. H	79731	60	F	Urban	2 weeks	Native treatment	Neck of femur fracture left side	9	Bipolar hemiarthroplasty	1	Good (81)
46. H	86869	43	M	Rural	6 weeks	Native treatment	Neck of femur fracture right side	8	Total hip replacement	2	Good (87)
47. H	87879	55	F	Urban	1 week	Not treated	Neck of femur fracture right side	9	Cancellous screw fixation	1	Excellent (91)
48. H	86872	60	M	Rural	2 weeks	Native treatment	Intertrochanteric fracture femur right side	9	Open reduction and internal fixation with dynamic hip screw and bone grafting	1	Excellent (93)
49. H	87972	45	M	Urban	2 weeks	Native treatment	Impacted neck of femur fracture right side	8	Conservative	3	Fair (77)

50. H	98023	19	M	Rural	12 weeks	Native treatment	Neck of femur fracture right side	7	Cancellous screw fixation	2	Good (86)
51. H	86837	28	M	Rural	190 weeks	Native treatment	Non-union Subtrochanteric fracture femur with intertrochanteric extension right side	6	Open reduction and internal fixation with proximal femoral nailing	2	Good (88)
52. H	75656	60	M	Urban	8 weeks	Native treatment	Neck of femur fracture right side	7	Bipolar hemiarthroplasty	2	Good (84)
53. H	74598	60	F	Rural	1 week	Not treated	Neck of femur fracture right side	9	Bipolar hemiarthroplasty	2	Good (83)
54. H	5870	49	F	Urban	2 weeks	Native treatment	Neck of femur fracture right side	9	Dynamic hip screw fixation	2	Good (82)
55. H	68697	45	M	Rural	1 week	Not treated	Neck of femur fracture left side	9	Cancellous screw fixation	1	Excellent (92)
56. H	45658	53	F	Rural	1 week	Not treated	Neck of femur fracture right side	9	Bipolar hemiarthroplasty	1	Excellent (95)
57. H	35458	35	M	Rural	8 weeks	Native treatment	Intertrochanteric fracture non-union femurleft side	7	Open reduction and internal fixation with proximal femoral nailing with bone grafting	2	Good (86)
58. H	647587	42	M	Urban	4 weeks	Native treatment	Neck of femur fracture left side	8	Total hip replacement	2	Good (87)
59. H	4769	40	F	Rural	21 weeks	Native treatment	Neck of femur fractureright side with avascular necrosis	6	Total hip replacement	1	Good (89)
60. H	47898	60	F	Rural	1 week	Not treated	Neck of femur fracture left side	9	Bipolar hemiarthroplasty	1	Excellent (93)
61. H	64769	60	M	Rural	1 week	Not treated	Intertrochanteric fracture femurleft side	9	Closed reduction and proximal femoral nailing	1	Excellent (92)

62. H	65769	60	M	Rural	4 weeks	Native treatment	Neck of femur fracture right side	8	Bipolar hemiarthroplasty	2	Good (84)
63. H	75869	60	F	Urban	21 weeks	Native treatment	Neck of femur fracture right side	7	Bipolar hemiarthroplasty	3	Fair (76)
64. H	43565	40	F	Rural	24 weeks	Native treatment	Head and neck of femur fracture right side	7	Bipolar hemiarthroplasty	3	Fair (74)
65. H	75868	60	F	Urban	2 weeks	Native treatment	Intertrochanteric fracture left side	9	Dynamic hip screw fixation	1	Excellent (91)
66. H	68790	30	F	Rural	2 weeks	Native treatment	Intertrochanteric fracture right side	9	Open reduction and internal fixation with proximal femoral nailing	0	Excellent (94)
67. H	65768	45	M	Rural	48 weeks	Native treatment	Acetabulum fracture with protrusioacetabuli	7	Total hip replacement with anti protrusio cage	2	Good (83)
68. H	78902	25	M	Rural	1 week	Not treated	Posterior dislocation right hip	9	Open reduction and capsular repair	1	Excellent (97)
69. H	57698	45	F	Urban	2 weeks	Native treatment	Neck of femur fracture left side	9	Total hip replacement	1	Good (78)
70. H	64758	17	M	Rural	2 weeks	Native treatment	Intertrochanteric fracture femur right side	9	Open reduction with dynamic hip screw fixation	1	Excellent (96)
71. H	76869	60	M	Urban	12 weeks	Native treatment	Intertrochanteric fracture femur right side	8	Open reduction internal fixation with dynamic hip screw and bone grafting	3	Fair (76)
72. H	65768	40	M	Rural	2 weeks	Native treatment	Neck of femur fracture right side	8	Closed reduction and cancellous screw fixation	2	Good (86)
73. H	65869	38	M	Urban	4 weeks	Native treatment	Intertrochanteric fractures left femur	8	Open reduction and internal fixation with dynamic condylar screw with bone grafting	1	Excellent (91)

74. H	65786	55	F	Rural	12 weeks	Native treatment	Malunited intertrochanteric fracture right femur	8	Conservative	3	Fair (77)
75. H	75787	60	M	Rural	12 weeks	Native treatment	Intertrochanteric fracture femur right side	8	Open reduction and internal fixation with dynamic condylar screw and bone grafting	3	Good (87)
76. H	4359	60	F	Rural	8 weeks	Native treatment	Neck of femur fracture left side	8	Total hip replacement	3	Fair (77)
77. H	6879	56	M	Urban	4 weeks	Native treatment	Neck of femur fracture left side	8	Bipolar hemiarthroplasty	2	Good (89)
78. H	7565	60	F	Rural	1 week	Not treated	Neck of femur fracture right side	9	Closed reduction and cancellous screw fixation	1	Excellent (93)
79. H	78676	45	M	Urban	2 weeks	Native treatment	Neck of femur fracture right side	9	Open reduction and cancellous screw fixation	1	Good (89)
80. H	64758	45	M	Rural	8 weeks	Native treatment	Neck of femur fracture left side	7	Total hip replacement	2	Fair (73)
81. H	67680	54	M	Rural	4 weeks	Native treatment	Intertrochanteric fracture right side	7	Open reduction and internal fixation with dynamic hip screw with bone grafting	2	Excellent (92)
82. H	862837	60	M	Rural	24 weeks	Native treatment	Intertrochanteric fracture right femur	6	Open reduction and internal fixation with dynamic condylar screw and bone grafting	2	Fair (72)
83. H	86382	55	M	Rural	1 week	Not treated	Intertrochanteric fracture right femur	9	Dynamic hip screw fixation	1	Excellent (96)
84. H	62537	42	M	Urban	2 weeks	Not treated	Intertrochanteric fracture left femur	9	Open reduction and internal fixation with dynamic hip screw	1	Excellent (92)
85. H	8687	60	M	Urban	8 weeks	Native treatment	Intertrochanteric fracture right femur	9	Open reduction and internal fixation with dynamic condylar screw and bone grafting	2	Fair (73)

86. H	5758	60	M	Rural	1 week	Not treated	Neck of femur fracture left side	9	Closed reduction and cancellous screw fixation	1	Excellent (98)
87. H	57689	49	M	Urban	4 weeks	Native treatment	Neck of femur fracture right side	8	Bipolar hemiarthroplasty	3	Fair (74)
88. H	64657	22	M	Rural	36 weeks	Native treatment	Neck of femur fracture right side	7	Bipolar hemiarthroplasty with adductor tenotomy	3	Fair (73)
89. H	4758	45	M	Rural	2 weeks	Not treated	Neck of femur fracture right side	9	Bipolar hemiarthroplasty	2	Good (83)
90. H	64658	50	F	Rural	2 weeks	Native treatment	Neck of femur fracture right side	9	Bipolar hemiarthroplasty	2	Good (82)
91. H	3658	40	F	Urban	8 weeks	Native treatment	Neck of femur fracture left side	7	Total hip replacement with adductor tenotomy	2	Fair (77)
92. H	576	60	M	Rural	24 weeks	Native treatment	Neck of femur fracture left side	7	Total hip replacement	2	Fair (77)
93. H	75879	25	M	Urban	5 week	Native treatment	Posterior dislocation of hip	9	Open reduction with Steinmann pin trans fixation of greater trochanter to acetabulum	1	Excellent (96)
94. H	65786	56	F	Urban	8 weeks	Native treatment	Neck of femur fracture left side	7	Total hip replacement	2	Good (86)
95. H	7587	55	F	Rural	1 week	Not treated	Neck of femur fracture right side	9	Total hip replacement	1	Excellent (98)
96. H	87979	58	F	Rural	3 weeks	Native treatment	Anterior dislocation of hip obturator type	9	Girdlestonearthroplasty	1	Good (88)

MASTER SHEET KNEE

Case.No.	IP NO	Age/ Gender	Area of residence	Cause of neglect	Diagnosis / duration of neglect	Pre procedure VAS	Procedure done	Post procedure VAS	Functional score
1K	5465	40/M	Rural	Native treatment	Supracondylar Fracture femur with tibial spine avulsion right side / 1 week	9	Open reduction and internal fixation with distal femur locking compression plate	2	Good (25)
2K	587	40/F	Rural	Native treatment	Left patella fracture / 16 weeks	6	Modified tension band wiring with bone grafting	1	Excellent (29)
3K	7569	58/M	Urban	Native treatment	Supracondylar fracture left femur / 1 week	9	Open reduction and internal fixation with distal femur locking compression plating and bone grafting	1	Excellent (28)
4K	676	60/M	Urban	Native treatment	Proximal tibia fracture right side / 3 weeks	7	Open reduction and internal fixation with medial column proximal tibia Locking compression plate	1	Excellent (28)
5K	7635	50/F	Urban	Lack of caregivers/mentally challenged	Left patella fracture / 1 week	9	Modified tension band wiring	1	Excellent (29)
6K	8798	54/M	Urban	Native treatment	Fracture nonunion right patella / 8 weeks	8	Modified tension band wiring with bone grafting	2	Good (24)
7K	7576	25/F	Rural	Not treated	Fracture nonunion distal right femur / 24 weeks	7	Open reduction and internal fixation with distal femur locking compression plate with bone grafting	2	Good (24)
8K	5786	47/M	Urban	Native treatment	Right tibial plateau fracture / 1.5 weeks	8	Open reduction and internal fixation with bicolumn proximal tibia locking compression plating	0	Excellent (29)

9K	6476	21/M	Rural	Native treatment	Supracondylar fracture right femur / 3 weeks	8	Open reduction and internal fixation with distal femur locking compression plate with bone grafting	1	Good (25)
10K	64758	60/F	Rural	Native treatment	Comminuted fracture right patella / 4 weeks	8	Patella circlage with loose fragment removal	3	Good (22)
11K	64758	40/M	Urban	Not treated	Medial condyle fracture femur with tibia lateral condyle fracture with patella fracture right side / 24 weeks	7	Open reduction and internal fixation with buttress plating for medial condyle femur and lateral condyle tibia with patella circlage	2	Unsatisfactory (19)
12K	42436	41/M	Urban	Native treatment	Bicondylar fracture with tibial plateau fracture right side / 3 weeks	8	Open reduction and internal fixation with bicolumn proximal tibia locking compression plating	1	Excellent (29)
13K	7687	45/M	Rural	Native treatment	Supracondylar fracture right femur / 1week	9	Open reduction and internal fixation with distal femur locking compression plate with bone grafting	1	Excellent (28)
14K	664	30/M	Urban	Native treatment	Comminuted Supracondylar fracture left femur / 2 weeks	9	Open reduction and internal fixation with distal femur locking compression plate with bone grafting	3	Good (23)
15K	7564	20/M	Rural	Native treatment	Head of fibula fracture with foot drop / 32 weeks	7	Open exploration of common peroneal nerve and resection of fibula head	0	Excellent (29)
16K	73086	60/M	Urban	Native treatment	Left patella fracture / 3 weeks	8	Modified tension band wiring	1	Excellent (28)
17K	5353	22/M	Rural	Native treatment	Right supracondylar fracture / 36 weeks	7	Open reduction and internal fixation with distal femur locking compression plate with bone grafting	1	Good (25)

MASTER SHEET ANKLE

Case.No.	IP NO	Age/ Gender	Area of residence	Cause of neglect	Diagnosis / duration of neglect	Pre procedure VAS	Procedure done	Post procedure VAS	Functional score
1A	7560	42/M	Rural	Native treatment	Bimalleolar fracture right ankle / 6 weeks	8	Open reduction and internal fixation with medial malleolus screw and fibular plating	0	Excellent(96)
2A	6487	42/M	Rural	Native treatment	Bimalleolar fracture left ankle / 144 weeks	6	Ankle arthrodesis with intramedullary nailing	3	Below unacceptable (76)
3A	5657	38/M	Urban	Native treatment	Tibial pilon fracture with lateral malleolus fracture right side / 2 weeks	8	Open reduction and internal fixation with medial malleolus screw and fibular plating buttress plating for distal tibia	2	Acceptable(84)
4A	7569	16/M	Urban	Native treatment	Right talus fracture / 48 weeks	7	Open reduction and internal fixation with screw fixation	2	Acceptable(88)
5A	5454	28/F	Urban	Native treatment	Trimalleolar fracture right ankle / 1 week	9	Open reduction and internal fixation with medial malleolus screw and fibular plating	3	Below unacceptable (78)
6A	6447	33/M	Urban	Native treatment	Trimalleolar fracture left ankle / 2 weeks	9	Open reduction and internal fixation with medial malleolus screw and fibular plating buttress plating for distal tibia	0	Excellent(96)
7A	75645	44/F	Rural	Native treatment	Trimalleolar fracture right ankle / 8 weeks	7	Open reduction and internal fixation with medial malleolus screw and fibular plating buttress plating for distal	1	Acceptable(88)

							tibia		
8A	6464	34/M	Urban	Native treatment	Nonunion medial malleolus fracture with distal 1/3rd tibia fibula fracture right side / 32 weeks	7	illizarov application	1	Acceptable(90)
9A	6454	26/M	Rural	Native treatment	Medial malleolus fracture left side / 1 week	9	Open reduction and internal fixation with screw fixation	0	Excellent(98)
10A	7564	50/M	Rural	Native treatment	Trimalleolar fracture right ankle / 48 weeks	7	Ankle arthrodesis with screw fixation	2	Acceptable(82)
11A	7648	35/M	Urban	Native treatment	Right talus fracture with medial malleolus fracture / 20 weeks	7	Open reduction and internal fixation with screw fixation and percutaneous talus screw fixation	3	Below unacceptable (76)
12A	75646	30/M	Urban	Native treatment	Left side ankle injury with post traumatic arthritis / 4 weeks	8	Ankle arthrodesis with screw fixation	1	Excellent(96)
13A	75646	44/F	Rural	Native treatment	Trimalleolar fracture right ankle / 8 weeks	8	Open reduction and internal fixation with medial malleolus screw and fibular plating and buttress plating for distal tibia	2	Acceptable(88)