Online ISSN : 2249-4618
Print ISSN : 0975-5888
DOI : 10.17406/GJMRA

Global Journal

of Medical Research: H

Orthopedic & Musculoskeletal System

Highlights

- Structure with Limbs Fractures
- Prolonged Bisphosphonate Therapy
- Posteromedial Dislocation Elbow
- Peritrochanteric Fracture Patients

Discovering Thoughts, Inventing Future

VOLUME 19 ISSUE 2 VERSION 1.0

Global Journal of Medical Research: H
Orthopedic and Musculoskeletal System

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Orthopedic and Musculoskeletal System

Volume 19 Issue 2 (Ver. 1.0)

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Global Journal of Medical Research: H
Orthopedic and Musculoskeletal System
Volume 19 Issue 2 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Posterior Tibial Nerve Schwannoma Mimicking Tarsal Tunnel Syndrome

By Joseph Maalouly M.D, Rami Ayoubi M.D, Hicham Abdel Nour M.D, Jad Koussaify M.D, Mohamad Badra M.D, Alexandre Nehme M.D & Ramzi Moucharafieh M.D

Balamand University

Abstract- Schwannomas are benign, encapsulated tumors derived from myelin sheath of nerves. They usually occur in the head and neck region and are uncommon in the extremities. The authors present a case of a schwannoma of the posterior tibial nerve sheath resulting in tarsal tunnel syndrome of the foot. The diagnosis, in this case, is made within two weeks of presentation and surgery is scheduled. The mass was excised measuring 1.1x0.9 cm and sent to pathology which confirmed the diagnosis of schwannoma of the posterior tibial nerve. The recommended therapeutic modality remains to be the complete excision of the tumor.

Keywords: *schwannoma, tarsal tunnel.*

GJMR-H Classification: *NLMC Code: WE 168*

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Posterior Tibial Nerve Schwannoma Mimicking Tarsal Tunnel Syndrome

Joseph Maalouly [α] M.D, Rami Ayoubi [σ] M.D, Hicham Abdel Nour [ρ] M.D, Jad Koussaify [ω], M.D, Mohamad Badra [ω] M.D, Alexandre Nehme [¥] M.D & Ramzi Moucharafieh [ω] M.D

Abstract- **Schwannomas are benign, encapsulated tumors derived from myelin sheath of nerves. They usually occur in the head and neck region and are uncommon in the extremities. The authors present a case of a schwannoma of the posterior tibial nerve sheath resulting in tarsal tunnel syndrome of the foot. The diagnosis, in this case, is made within two weeks of presentation and surgery is scheduled. The mass was excised measuring 1.1x0.9 cm and sent to pathology which confirmed the diagnosis of schwannoma of the posterior tibial nerve. The recommended therapeutic modality remains to be the complete excision of the tumor.**

Keywords: schwannoma, tarsal tunnel.

I. Introduction

Schwannomas are benign, encapsulated tumors derived from myelin sheath of nerves. (1) They originate from Schwann cells of neuroectoderm and as they expand they can compress nerves leading to pain, weakness, and numbness. Schwannomas usually occur in the head and neck region and are uncommon in extremities. (2) They are the most common type of peripheral nerve sheath tumor, with no gender predisposition, nonspecific age group but risk factors include trauma and neurofibromatosis type 2. (3) The tumor is slow growing and eccentric to the nerve fibers. Malignant transformation of schwannoma is very rare. The clinical diagnosis is often straightforward; however, delay for many years have been reported in schwannoma of the posterior tibial nerve as symptoms usually mimic entrapment neuropathy or lumbosacral radiculopathy.

In cases with posterior tibial nerve schwannoma, nerve conduction velocity studies can be abnormal, but, a schwannoma often does not interfere with nerve function, therefore delayed conduction velocities are nonspecific for this lesion. (4)

Ultrasound can confirm the presence of the schwannoma, but magnetic resonance imaging (MRI) is the modality of choice to identify the tumor, with its margins and characteristics. (5)

Nevertheless, MRI cannot distinguish between malignant and benign tumors. (6)

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II. Case Report

A 39 y.o. Male patient previously healthy presented with left foot pain and numbness of 2 months duration. Patient denies any history of trauma and has no history to suggest neurofibromatosis. On physical exam, a small mass was palpated posterior to the medial malleolus with a positive Tinel sign. Radiographs were normal and requested MRI revealed a nerve sheath tumor (fig 1), most likely a schwannoma, adhering to the flexor hallucis longus tendon and posterior tibial nerve roots. Removal of the tumor is scheduled.

Under general anesthesia, using a medial incision posterior to the medial malleolus and under microscope magnification (fig 2 and 3), microdissection was performed, and the posterior tibial nerve was tagged using vessel loop proximally and distally, the mass was excised measuring 1.1x0.9 cm and is sent to pathology. This is followed by irrigation, hemostasis, and closure of the wound. The patient is discharged the second-day postop with minimal pain, and full weight bearing ambulation. The histologic report confirmed the diagnosis of the posterior tibial nerve schwannoma with no evidence of malignancy (fig 4). The patient's swelling and numbness resolved within a few weeks, and he resumed his daily activities without discomfort.

III. Discussion

The most common tumors of the peripheral nerve sheath are Schwannomas with infrequent occurrence in lower extremities. (7,8) They are slow growing tumors with a very low rate of malignant transformation. Few cases reported in the literature whereby schwannoma of posterior tibial nerve shows compression neuropathy. (9) In all reported cases, complete surgical excision showed good results with symptoms resolution.

A peculiar aspect of these tumors is a delay of diagnosis. Nawabi and Sinisi (9) in their series revealed a mean time diagnostic delay of 86.5 months.

Surgical excision is the treatment modality of choice once the diagnosis is clear. (10) All similarly reported cases gave good results with no recurrence when the dissection is thorough. (11)

Based on our case and literature review, we believe that any patient presenting with symptoms of

neuropathy of the foot without apparent evidence of lumbosacral radiculopathy or compression neuropathy should be investigated further. The mass may not be palpable and delay in diagnosis is common as they are usually deep or misdiagnosed (9). A complete physical exam is crucial in these cases, whereby a positive Tinel sign along the course of the nerve may raise our suspicion of the diagnosis.

Furthermore, the use of a microscope is crucial, to avoid damage of fascicles and for thorough excision of the tumor. (11)

IV. Conclusion

From our case, a schwannoma of the posterior tibial nerve could present as tarsal tunnel syndrome with a positive Tinel sign and a palpable mass. MRI confirms the diagnosis. Suspicion should remain high for these tumors as misdiagnosis occurs frequently which leads to wrong treatment administration and failure of therapy. Complete excision of the lesion by thorough dissection taking care to protect the nerve fibers with the aid of microscope magnification is the ideal way of managing such cases.

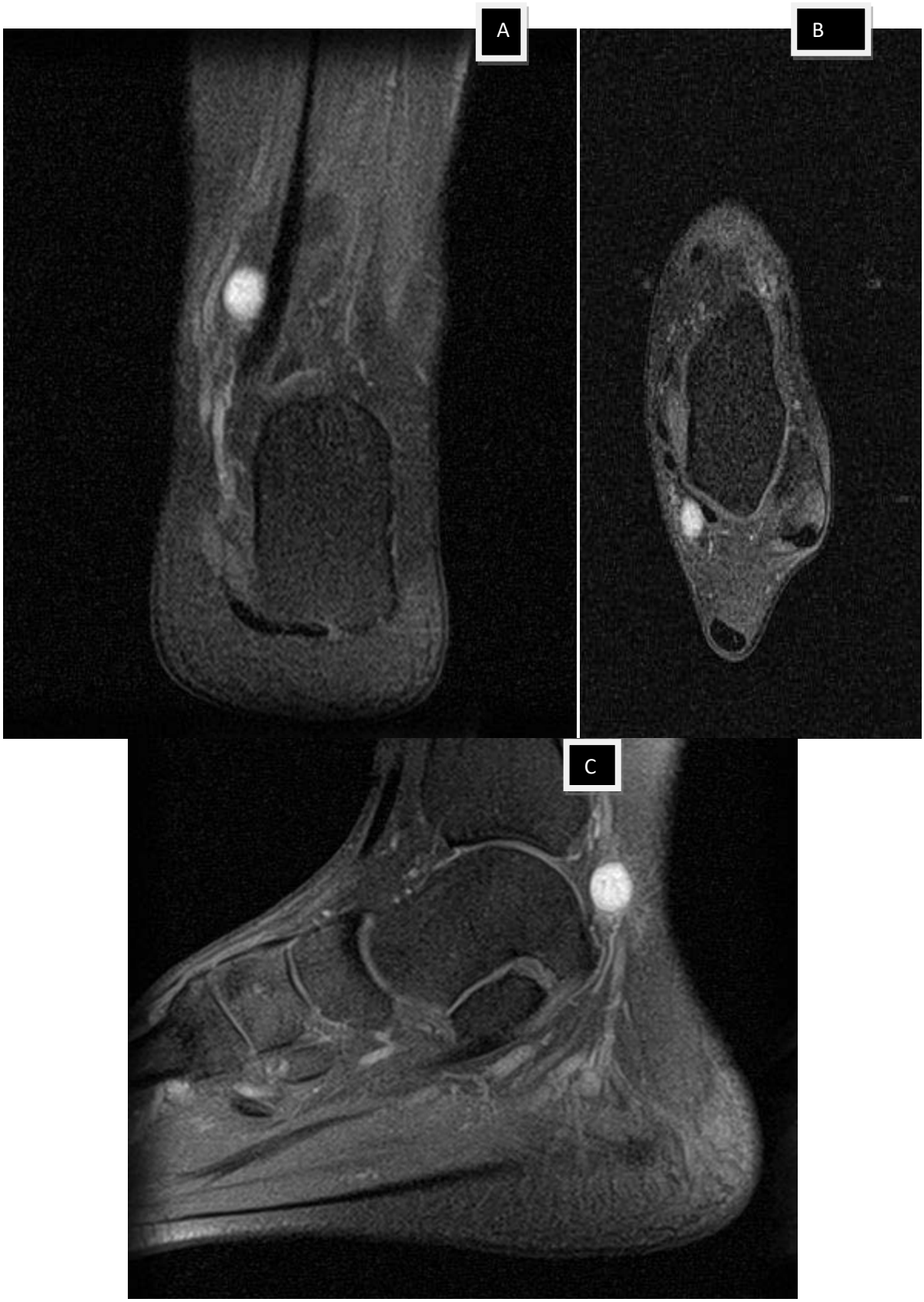

Figure 1: (a) Coronal MRI showing enhancement of lesion with contrast adhering to posterior tibial nerve (b) Axial MRI cuts showing enhancement of lesion with contrast (c) Sagittal MRI cuts showing enhancement of lesion with contrast adhering to flexor hallucis tendon

Figure 2: Schwannoma of posterior tibial nerve on medial aspect of ankle

Figure 3: Schwannoma of posterior tibal nerve excised

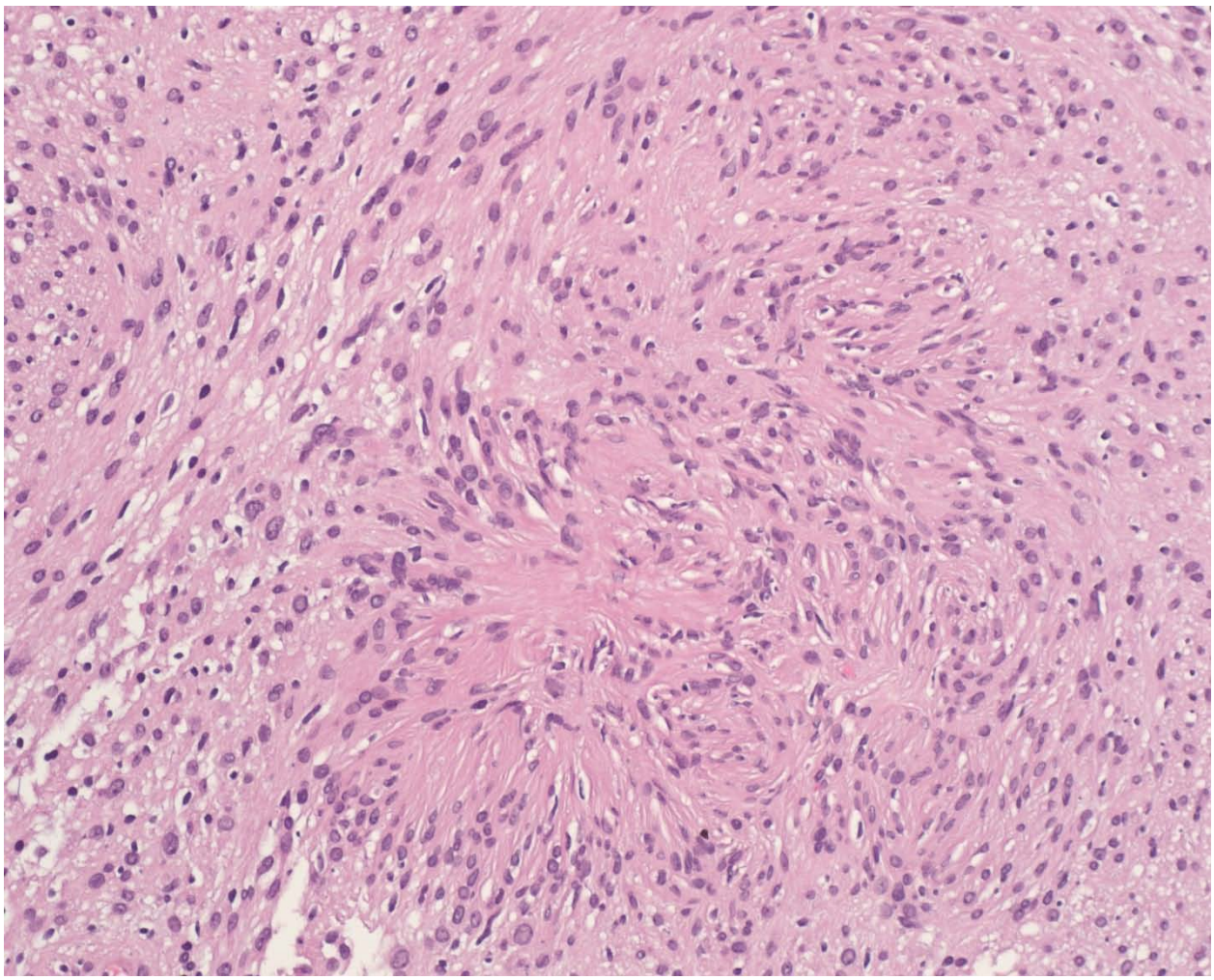

Figure 4: Neural fascicles with palisading nuclei (H&E x200)

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Global Journal of Medical Research: H
Orthopedic and Musculoskeletal System
Volume 19 Issue 2 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Osteoporosis - Does it impact Post Operative Mobility, in Peritrochanteric Fracture Patients?

By Dr. Sandeep Krishna Avulapati DNB(ortho), Dr. Prasad Babu D'Ortho, (DNB), Dr. Chittaranjan Sahu MS(ortho), Dr. Senthil Kumar Mahalingam D'Ortho, Dr. Jagadeesh Gudaru MS(ortho) & Dr. Karthick Gudaru MS(ortho)

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Abstract- *Background:* Osteoporotic fractures are common and occur in aging and elderly population. Of these proximal femur fractures are the most disabling and can result in increased morbidity and mortality. Osteoporosis, determines the type of fracture but also affect reduction of fracture during surgery and post-operative mobility of the individual.

Aim: To evaluate the correlation between Osteoporosis, and post-operative mobility in patients, with proximal femur fractures.

Null Hypothesis: There is no significant correlation between the Osteoporosis, and post-operative mobility of the patients in a proximal femur fracture.

Keywords: *osteoporosis, peritrochanteric fractures, pre and post-operative mobility, daily activities of living.*

GJMR-H Classification: *NLMC Code: WE 250*

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Aim: To evaluate the correlation between Osteoporosis, and post-operative mobility in patients, with proximal femur fractures.

Null Hypothesis: There is no significant correlation between the Osteoporosis, and post-operative mobility of the patients in a proximal femur fracture.

Method: A retrospective study was carried out during the period March 2017 to March 2018 in BIRRD (T) Hospital. Patients, who underwent proximal femur fracture surgeries after fulfilling the inclusion and exclusion criteria, were included in the study. Patients evaluated for Osteoporosis with Singh's Index, fracture type, Pre and Post-Operative mobility patterns.

Results: The study included 50 patients, but complete data was available for 40 patients. Remaining ten patients could not present for follow-up and were excluded from the study. Four patients included in the study, expired during the study.

Conclusion: Null hypothesis remains rejected.

Keywords: osteoporosis, peritrochanteric fractures, pre and post-operative mobility, daily activities of living.

I. Introduction

Proximal femur fractures include fracture neck of femur, inter and Subtrochanteric fractures. These result in mortality and morbidity in the elderly population aged above 50 years. 14-36% of patients expire within one year of proximal femur fractures.[1] This increases to 50% in nonoperative patients. The incidence of these fractures is increasing in India with the aging population, which can soon or later become an epidemic in orthopedic surgery. These fractures have added stress to limitedly available health resources of country.[2] Patients who sustain second hip fracture is about 10-13%, which further adds to decreased mobility status and increased social dependence.[2]

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70% of women (>80 years) have osteoporosis, with 60% experience one or other fractures (hip fractures, vertebral compression fractures, distal end radius fractures, shoulder fractures, pelvic fractures mainly pubic rami fractures).[3] Minimal trauma and domestic falls can result in these fractures. Many factors influence post-operative mobility in patients with proximal femur fractures, such as osteoporosis, age of patient, time of presentation to hospital after injury or fall, presence of co-morbidities, surgery (surgeon, reduction, surgery time), post-surgery mobilization, social help for recovery, mental status of patients before the surgery.[4]

Osteoporosis (senile, secondary) causes of proximal femur fractures in the elderly. We do want to find, whether there exists a correlation between osteoporosis and post-operative mobility of the patient, time required for returning to daily activities of living. Hence we propose a Null Hypothesis that there exists no correlation between these variables in proximal femur fracture patients.

II. Materials and Methods

A retrospective study conducted from 1st March 2017 to 1st March 2018. All proximal femur fracture admitted into BIRRD (T) hospital and those underwent surgery, included in the study after satisfying inclusion and exclusion criteria. Post-operative follow-up limited to an year. Patient admitted into our hospital are mostly from a rural background, with farming as occupation. Observing X-Ray, osteoporosis grading done with Singh's Index. Patients grouped into fracture neck of femur, Intertrochanteric, and Subtrochanteric fractures. Their pre-operative (mobility status before fracture), and post-operative mobility recorded. Abbreviated mental score test before surgery recorded.[4,9] Mobility assessed with New Mobility Score by M J Parker, 1995.

Table 1: Shows Assessment of New Mobility Score before Fracture.[5] Score is total 0-9

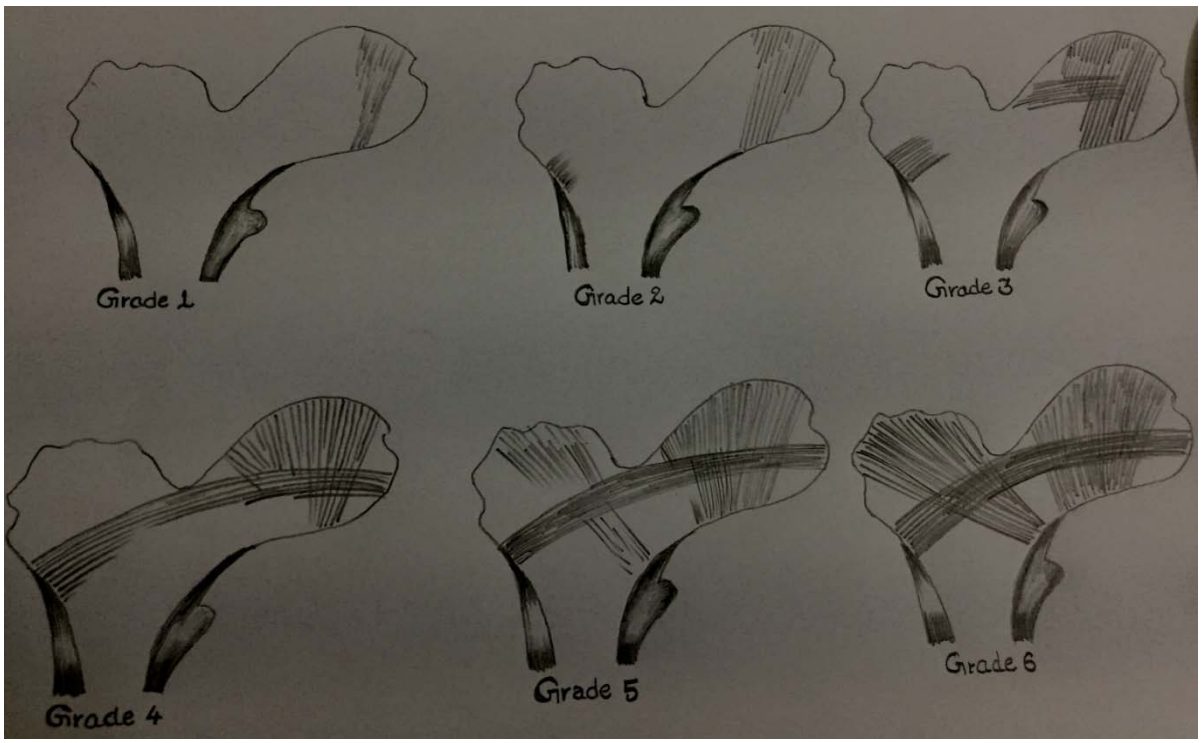
Mobility	No difficulty	With an Aid	With help of another person	Not at all
Able to get about the house	3	2	1	0
Able to get out of house	3	2	1	0
Able to go shopping	3	2	1	0

a) Inclusion Criteria

1. Patients with age >50 years with Hip fractures (Peritrochanteric fractures)
2. Unilateral fractures

b) Exclusion Criteria

1. Patients with age < 50 years
2. Childhood illness like polio, cerebral palsy, neuromuscular disorders
3. Non-co-operative patients
4. Psychiatric illness patients
5. Patients with native and conservative treatment of fractures
6. Pathological fractures other than osteoporosis
7. Patients with any other fractures other than hip fractures
8. Patients rejected for surgery by Anesthetists



Picture 1: Drawn picture showing various grades of osteoporosis as per Singh's Index.[6]

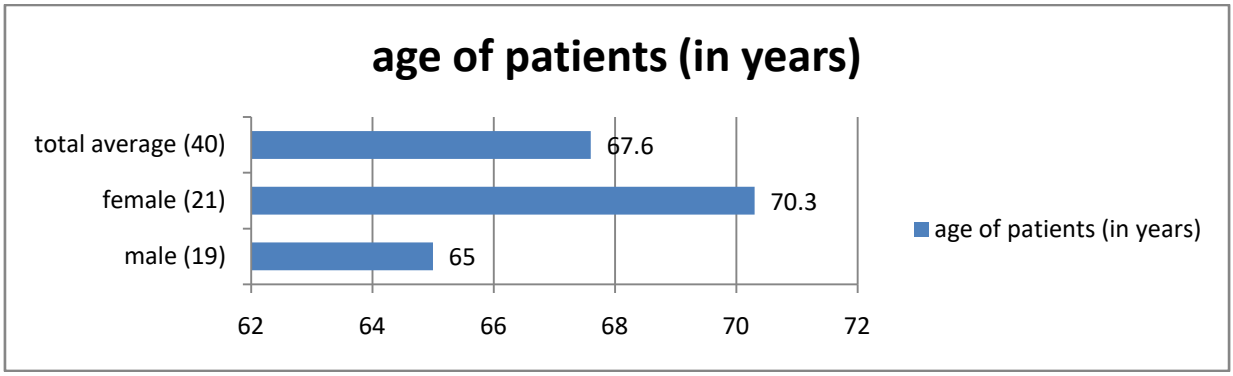
c) Statistical analysis

Through Pearson correlation analysis, simple average calculations.

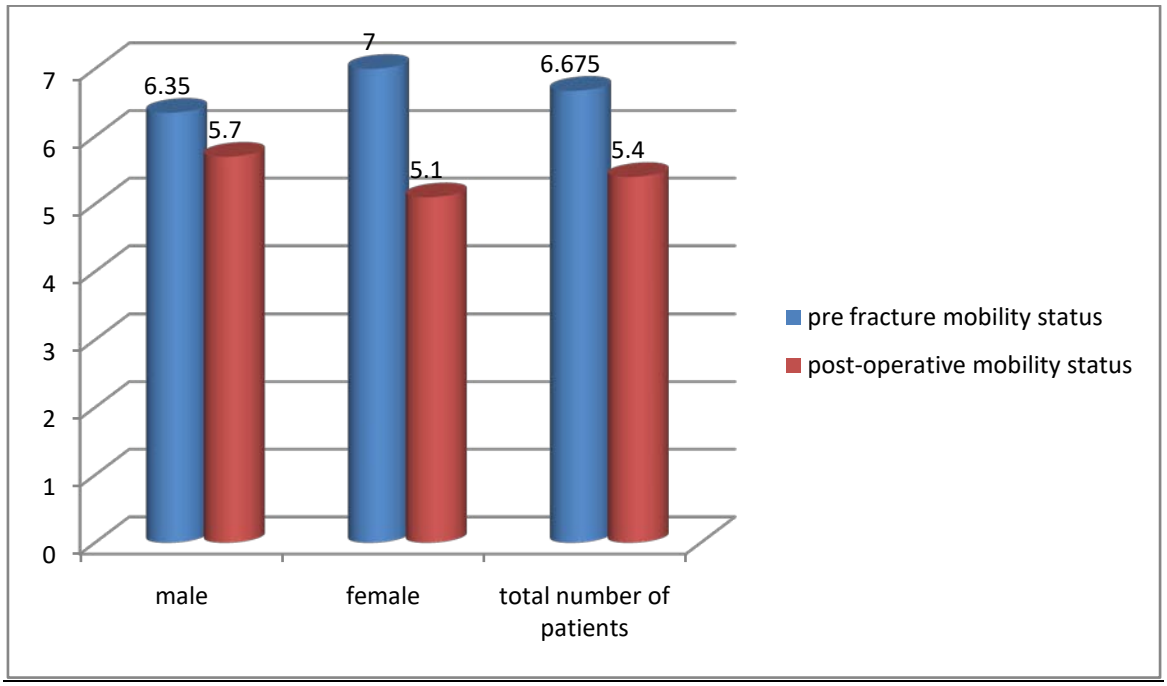
III. Observation and Results

The retrospective study included 50 patients treated in our hospital for proximal femur fractures, but ten people could not present for follow-up. We had complete data of 40 patients. One patient expired, during the procedure on the fracture table, during fixation. Other three patients expired during various periods of study, i.e. ; one expired due to stroke in the local hospital four months later, the other two patients expired due to post-operative complications.

In all, 20 female and 20 male patients, with an average age of 67.6 years (male-65 years and female-70.3 years). There are 22 Intertrochanteric fractures, 3 Subtrochanteric fractures and 15 fracture neck of femur.

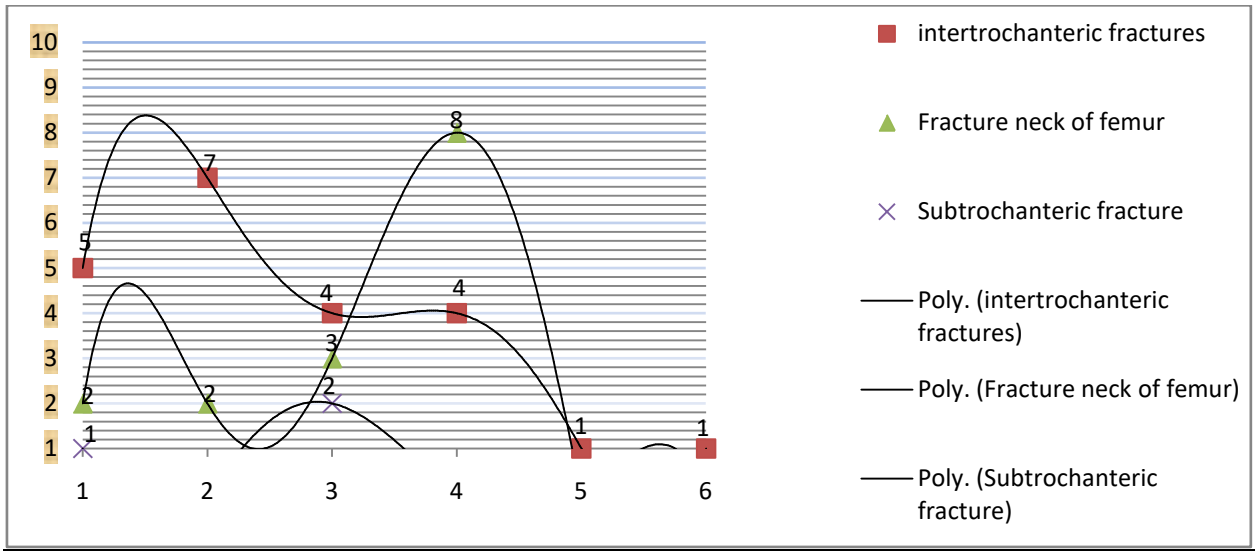


Picture 2: Bar chart, showing the average age of the male, female, and total no of patients in the study



Picture 3: Graph showing the difference between pre and post-operative mobility in Male, Female and total number of patients

Average pre-operative mobility (mobility before the fracture) was 6.67 and came down to 5.4. Abbreviated mental score test was 7.85.



Picture 4: Scatter Plot is showing osteoporosis grade (Singh's Index), fracture type and trends between

We in our study intend to find out whether there exists any correlation between osteoporosis and pre and post-operative mobility through correlation test (Pearson test). We proposed a *Null Hypothesis* that there is no co-relation between these variables. On analysis, we found that these variables were related to each other. There is a positive correlation between the variables, but the intensity of the relationship between them varies as shown in table.2

Table 2: Shows the intensity of the relationship between these variables

Intensity of co-relationship	Variables
Stronger	• Pre-operative Versus Post-operative mobility status
Moderate	• Osteoporosis Versus Time taken to return to daily activities of living
Weak	• Osteoporosis Versus Post-operative mobility • Osteoporosis Versus Pre operative mobility

Hence the *null hypothesis* remains rejected.

IV. Discussion

Osteoporosis, a condition which can cause disability and present a burden to already constrained health budget in developing countries, through fractures. Forget about the disability in old age due to constant osteoporotic pain; it can influence the type, and comminution of fracture, reduction and fixation during surgery, the healing time and mobilization of patients' post-operatively.[7]

In the study we intend to find out whether there exists a correlation between the osteoporosis and pre-fracture mobility and post-operative fracture mobility of patients. We used Singh's index in the grading of osteoporosis. We used the new mobility score to determine the mobility status of patients before the fracture and post-operatively. We found there exists the correlation between these variables which is positive i.e.; those patients with good bone strength will have a better pre-operative mobility, post-operative mobility, and early return to daily activities of living.

The reasons we project or infer towards this positive co-relation are:

1. Osteoporosis will impact the fracture type (the more the osteoporotic it will be Intertrochanteric).
2. Osteoporosis will result in more comminution of fracture (more comminution of fracture fragment will result in difficulty in reduction, increase surgery time, these fragments devoid of blood supply can influence union process at a later date)
3. Osteoporosis will influence the post op mobility (comminution increases post-operative recovery, time for mobilization)
4. Fracture neck of femur operated with bipolar and THR will have good post-operative mobility than Intertrochanteric fractures.
5. Intertrochanteric fractures operated with Proximal Femur nailing have good post-operative mobility than operated with DHS.

There is positive correlation between these variables, but intensity varies. There appears a strong relation between the pre-fracture mobility and post-operative fracture mobility followed by osteoporosis and its influence in return to daily activities of living. Per se we know the constraints of the study, a small sample size. Perhaps, an increase in the sample size can reveal the correlation in a better way. Osteoporosis influences

the healing of fracture which in turn affects the post-operative mobility and early return to daily activities of living.

Table 3: Shows correlation co-efficient between variables

Variables	Total no: of fractures	Intertrochanteric fractures	Fracture neck of fractures
Osteoporosis versus pre-operative mobility status	0.0423	0.1330	0.0839
Osteoporosis versus post- operative mobility status	0.1083	0.0193	0.2855
Pre operative and post-operative mobility status	0.5107	0.5914	0.4472
Osteoporosis versus time taken for return to activities of daily living	0.3399	0.4315	0.0238

($P<0.05$)

One year mortality rate in hip fractures is about 10%-25% in various studies.[1,8] In the study we have 10% mortality i.e. ;one patient expired during the surgery and remaining three due to post-operative complications (four out of 40 patients). In our study Picture, No.4 shows that the stronger the bone, the less number of fractures can be expected i.e. ; As osteoporosis decreases the fractures also decreases.

V. Conclusion

We infer that there exists a positive correlation between the osteoporosis and post-operative mobility of patients in proximal femur fractures, but also it influences the early return of daily activities of living after the surgery. Hence prevention of osteoporosis in the aging population decreases the incidence of proximal femur fractures, economic burden and disability in that particular population.

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Global Journal of Medical Research: H
Orthopedic and Musculoskeletal System
Volume 19 Issue 2 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Metabolic Syndrome in the Affected Structure with Limbs Fractures

By Karimov M.Y., Yakubdjanov R.R., Kayumov U.K., Ibadova M.U. & Kabilov N.R.

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Abstract- The paper studied metabolic syndrome in the structure of victims with broken limbs. Analyzed the results of examination and surgical treatment of 202 patients with fractures of the limbs on the background of metabolic syndrome. Developed a multidisciplinary approach involving cardiologist, endocrinologist, anaesthetist and expert in resuscitation for planning surgical intervention can reduce intra and postoperative complications.

Keywords: metabolic syndrome; limb fractures; intramedullary osteosynthesis blocking; central venous pressure.

GJMR-H Classification: NLMC Code: WE 175

Strictly as per the compliance and regulations of:

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I. Introduction

Metabolic syndrome (MS) is a complex of interrelated disorders of carbohydrate and fat metabolism, as well as mechanisms of regulation of blood pressure (BP) and endothelial function, the development of which is insulin resistance [1,2,3,4,5,6].

The prevalence of metabolic syndrome (MS) in the adult population reaches 25.8% and increases significantly with age [7].

The available literature has not sufficiently studied the structure of victims with limb fractures, the effect of surgery on the results of treatment, against the background of the metabolic syndrome. Not developed a systemic approach, taking into account hypertension, diabetes mellitus, before and after surgical treatment. Taking into account the gerontological age of all injured patients, the goal was set - to study the structure of the victims of long bone fractures, against the background of the metabolic syndrome.

II. Material and Methods

The results of the treatment of 202 patients with fractures of the limb, on the background of the metabolic syndrome, in the period from 2015 to 2017 have been studied. Men 78 people (39%), women 124 people (61). The average age of patients was 69 years. Of these, 21 closed fracture of the humerus, closed fracture of the femoral neck, 91 cases, closed fracture of the femur diaphysis, 31 cases, closed fracture of the bones of the tibia, 59 cases.

Table 1: Patients with limb fractures

Closedhumerusfracture	21
Closedfemoralneckfracture	91
Closed fracture of the femur diaphysis	31
Closedshinbonesfracture	59

140 (69.3%) patients underwent the following surgical intervention: closed Intramedullary osteosynthesis blocking (IOSB) of the femoral diaphysis 11, open osteosynthesis of the proximal femur 10 cases, closed osteosynthesis of the femoral neck using the spokes 31 cases. Closed leg diaphysis IOSB 9 cases, osteosynthesis with screws for 46 cases, closedIOSB shoulder 3, closed shoulder osteosynthesis with needles for 30 cases.

Table 2: Patients underwent the following surgery

ClosedIOSBdiaphysisship	11
Open osteosynthesis of the proximal femur	10
Closed osteosynthesis of the femoral neck with needles	31
ClosedIOSBlegdiaphysis	9
Osteosynthesiswithscrews	46
ClosedIOSBshoulder	3
Closed shoulder osteosynthesis with needles	30

III. Results and Discussion

143 (70%) cases were observed leading in frequency of metabolic syndrome: Of the 202 patients examined, ischemic heart diseases (IHD) and hypertension were observed, a history of myocardial infarction and acute cerebral circulation disturbance in 27 (13.3%) patients. Diabetes mellitus 46 (23%), impaired glucose tolerance 56 (28%), obesity in 112 (56%) patients, cholelithiasis 89 (44%), chronic

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pyelonephritis and urinary tract infections 96 (47.5%) others.

Table 3: Leading in frequency of metabolic syndrome

Coronary artery disease and hypertension	143 (70%)
Diabetes mellitus	46 (23%)
Impairedglucosetolerance	56 (28%)
Obesity	112(56%)
Gallstonedisease	89 (44%)
Chronic pyelonephritis and urinary tract infections	96 (47,5%)

More often they were observed in combination. With the onset of a fracture in patients, an exacerbation of chronic pathology was observed: the cardiovascular system, hypertensive crisis, acute coronary syndrome, hypercoagulative syndrome. Increased blood sugar, hypovolemic shock, violation of a number of biochemical parameters of blood, etc. All these pathological conditions exacerbate the course of traumatic disease. Prior to the operating period, joint adjustments were required, by a cardiologist, an endocrinologist, an anesthesiologist, and a resuscitator. All patients were investigated according to the developed algorithm - a multidisciplinary approach. The examination included: complete blood count, formula, coagulogram, blood biochemistry, blood sugar dynamics, ECG, EchoCS, duplex examination of the vessels of the lower limb over time. 30.7% (62) of patients with a deterioration of somatic status, absolute contraindications of anesthesia, it was decided to transfer to conservative treatment. A study on comorbidity revealed that all patients have two or more pathologies. Two different pathologies (86 people, 42.5%). The combination of the three pathologies was observed in 79 people (39.2%). In 37 patients, four or more pathologies were observed (18.3%). Examination of hemocoagulation status revealed that almost all patients showed an increased risk of thromboembolic complications, coagulation beginning 2.2 end 3.1; the amount of fibrinogen reached 550±0.6 g/l. and higher. This and other indicators of the blood coagulation system indicated a high risk of thromboembolic complications. Indicators of central venous pressure (CVP) in the examined patients showed an average of 60-40 (normal 80-120) mm water column. CVP of patients was characterized by a decrease in the volume of circulating blood — hypovolemia, decrease in cardiac output, hypoxia of a predominantly circulatory type. All this ultimately led to an increase in hypovolemic shock. Given the age, injury, difficult compensation of hypovolemic shock, is an aggravating factor for the victim. At the same time, CVP is an important diagnostic information in predicting the general condition of the victim. The level of central venous pressure (CVP), that is, the pressure in the right atrium, has a significant effect on the amount of venous return of blood to the heart. With a decrease in pressure in the right atrium from 0 to - 4 mm Hg. the inflow of venous blood increases by 20-30%, but when the pressure in it becomes lower than−4 mmHg, a further decrease in pressure does not cause an increase in the inflow of venous blood. This lack of influence of a strong negative pressure in the right atrium on the amount of venous blood flow is explained by the fact that in the case when the blood pressure in the veins becomes sharply negative, there is a collapse of the veins flowing into the chest. If the decrease in CVP increases the flow of venous blood to the heart through the hollow veins, then its increase by 1 mm Hg. reduces venous return by 14%. Consequently, the increase in pressure in the right atrium to 7 mm Hg. should reduce the flow of venous blood to the heart to zero, which would lead to catastrophic hemodynamic disturbances.

IV. Findings

Thus, it was determined that patients with fractures of long bones, against the background of the metabolic syndrome, belong to the somatically severe category of patients. The findings indicate that a differentiated approach reduces intra and postoperative complications. A multidisciplinary approach involving a cardiologist, an endocrinologist, an anesthesiologist, and a resuscitator is required to plan an intervention.

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Global Journal of Medical Research: H
Orthopedic and Musculoskeletal System
Volume 19 Issue 2 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Complex Elbow Trauma in Children: A Rare Case of Posteromedial Dislocation Elbow with Fracture Lateral Humeral Condyle

By Dr. Lakshya Prateek Rathore, Naina Verma, Apoorv Sehgal, Virender Negi, Sidharath Sood & Chhewang Topgia

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Abstract- Concomitant fracture of lateral humeral condylar physis along with dislocation of the elbow is a rare entity. There is a paucity of literature on the topic with previous citation being isolated case reports or case series of 3-4 cases. Inasmuch as the treatment of lateral condyle is open reduction internal fixation, it is imperative that standard protocols are followed in order to expect a good outcome. We report a case of 11 year old male child with such an injury who was managed with operative intervention followed by excellent outcome. Subsequently we wish further add upon the existing limited knowledge on the management of this complex injury pattern.

Keywords: *fracture, dislocation, elbow, lateral condyle, rare, children.*

GJMR-H Classification: *NLMC Code: WE 180*

Strictly as per the compliance and regulations of:

Complex Elbow Trauma in Children: A Rare Case of Posteromedial Dislocation Elbow with Fracture Lateral Humeral Condyle

Dr. Lakshya Prateek Rathore [α], Naina Verma [σ], Apoorv Sehgal [ρ], Virender Negi [ω], Sidharath Sood [¥] & Chhewang Topgia [§]

Abstract- **Concomitant fracture of lateral humeral condylar physis along with dislocation of the elbow is a rare entity. There is a paucity of literature on the topic with previous citation being isolated case reports or case series of 3-4 cases. Inasmuch as the treatment of lateral condyle is open reduction internal fixation, it is imperative that standard protocols are followed in order to expect a good outcome. We report a case of 11 year old male child with such an injury who was managed with operative intervention followed by excellent outcome. Subsequently we wish further add upon the existing limited knowledge on the management of this complex injury pattern.**

Keywords: fracture, dislocation, elbow, lateral condyle, rare, children.

I. Introduction

Isolated traumatic dislocation of the elbow in children is a rare injury constituting 3–6% of all elbow injuries.[1,2] Elbow dislocations are usually posterior or posterolateral[3] and they may be associated with fractures like medial epicondyle, coronoid process, radial head and olecranon. Posteromedial dislocation of the paediatric elbow is per se very rare and on top of that their association with a lateral humeral condyle fracture is extremely rare.[4,5] We are presenting one such rare case.

II. Case Presentation

An 11 year old male child presented to us with a history of injury to his right elbow after fall from bicycle on an outstretched hand. On examination there was diffuse swelling present around the elbow along with deformity with marked tenderness over the lateral condyle without any distal nerovascular deficit. The anteroposterior and lateral radiographs showed posteromedial dislocation of elbow with fracture of the lateral condyle of humerus (Figure 1 and Figure 2).

Closed reduction of the elbow was performed under intravenous conscious sedation and analgesia. Post reduction radiographs showed Milch type II fracture of humeral condyle (Figure 3 and 4).

Informed consent was taken from the parents and patient was taken up for surgery. Under general anesthesia elbow was closed reduced and found to be stable throughout range of motion. A standard lateral approach for elbow was used to access the fracture site, reduced under vision and fixed with two smooth K wires. Furthermore, again the elbow was found to be stable. A plaster of Paris above elbow slab was applied. Post-operative period was uneventful.

III. Results

Postoperative radiographs (figure 5 and 6) showed anatomical reduction with a congruent joint. Wound healed well and sutures were removed after 2 weeks. Serial x-rays showed expected fracture healing and elbow range of motion started after removal of k wire at 6 weeks. Patient showed good recovery and at 10 month follow up (figure 7) patient has a mayo elbow score of 100 and excellent outcome with a stable elbow. Furthermore no complication was observed.

IV. Discussion

In children, elbow dislocation is not very common with peak incidence in the adolescent age group. It is usually classified based on the direction of displacement. Although their association with medial epicondyle fracture is well known which can sometimes be incarcerated in the joint, their concomitant incidence with #lateral condyle is a very rare occurrence.[2,5,6,12,13]

Fractures of the lateral condylar physis constitute 16.9% of distal humeral fractures.[14] Fractures involving the lateral condylar physis occur early, with the average age around 6 years which can fracture both by pull and push-off mechanism after fall on outsretched hand.[15,16]

Fracture of the lateral condylar physis is usually classified by Milch classification system and

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displacement stages are divided into three parts. Our patient had Milch type 2 fracture pattern with stage 3 of displacement which is in concert with reportings in most of the previous studies. This is an easily discernible fact since the lateral crista support is lost in Milch type2 fracture patterns allowing for dislocation. However some have reported Milch type1 fracture patterns also in this type of injury.[17,18]

As was described by Morrey in his study that primarily a varus force causes such a complex injury where body is falling over the elbow medially as compared from laterally.[19] The position of the forearm has been widely advocated as supinated with fracture occurring due to pull of the long extensor muscles of the forearm.[20]

Here one may argue that in a #lateral condyle Milch type 2 which is an unstable configuration distal part is likely to displace laterally as was originally described by late Dr Henry Milch (figure 8) and later in many studies.[12,21]

The displacement in this rare complex injury has been characteristically described as postermedial in previous reports[4,22,23,24] as was the case in our patient. Furthermore newer studies are indicating towards a concomitant injury in up to three-fourth of the cases.[25]

Alignment between the radial head and capitellum is an important guideline for diagnosing different types of elbow injuries in children. Displaced fracture of lateral condyle will misalign this relationship and so will a dislocation, however not so much in injuries occurring superior to the elbow joint.[26,27] In our case the alignment was maintained which was attributed to the intact lateral collateral ligament as was found per-operatively. Similar findings have been reported in previous studies also.[28]

Fixation of displaced lateral condyle fractures is standard protocol to avoid late complications notably the non-union, osteonecrosis of trochlea and angular deformities.[9]Most studies have reported management protocol as prompt closed reduction which was done immediately following xrays under conscious sedation and analgesia. This is followed by open reduction and internal fixation with smooth k wires since it is a Salter-Harris type 4 injury and has shown excellent result in the past.[4,29,30,31] A good reduction under vision and a stable elbow are likely to give satisfactory results.

V. Conclusion

The posteromedial dislocation of the elbow associated with fracture of the lateral humeral condyle is a rare injury and is not difficult to treat. A good concentric reduction of dislocation and good fixation of lateral condyle fracture is mainstay of the treatment of these injuries in isolation or in combination. The knowledge of probable associated injuries helps in anticipation and detection leading to optimal management.

Ethical issues

Informed consent taken for surgery and future publication.

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Figure 1 and 2: Pre-operative radiograph showing #lateral condyle humerus with posteromedial dislocation

Figure 3 and 4: x-rays after closed reduction

Figure 5 and 6: x-rays showing fixation of lateral condyle humerus with 2 k-wires

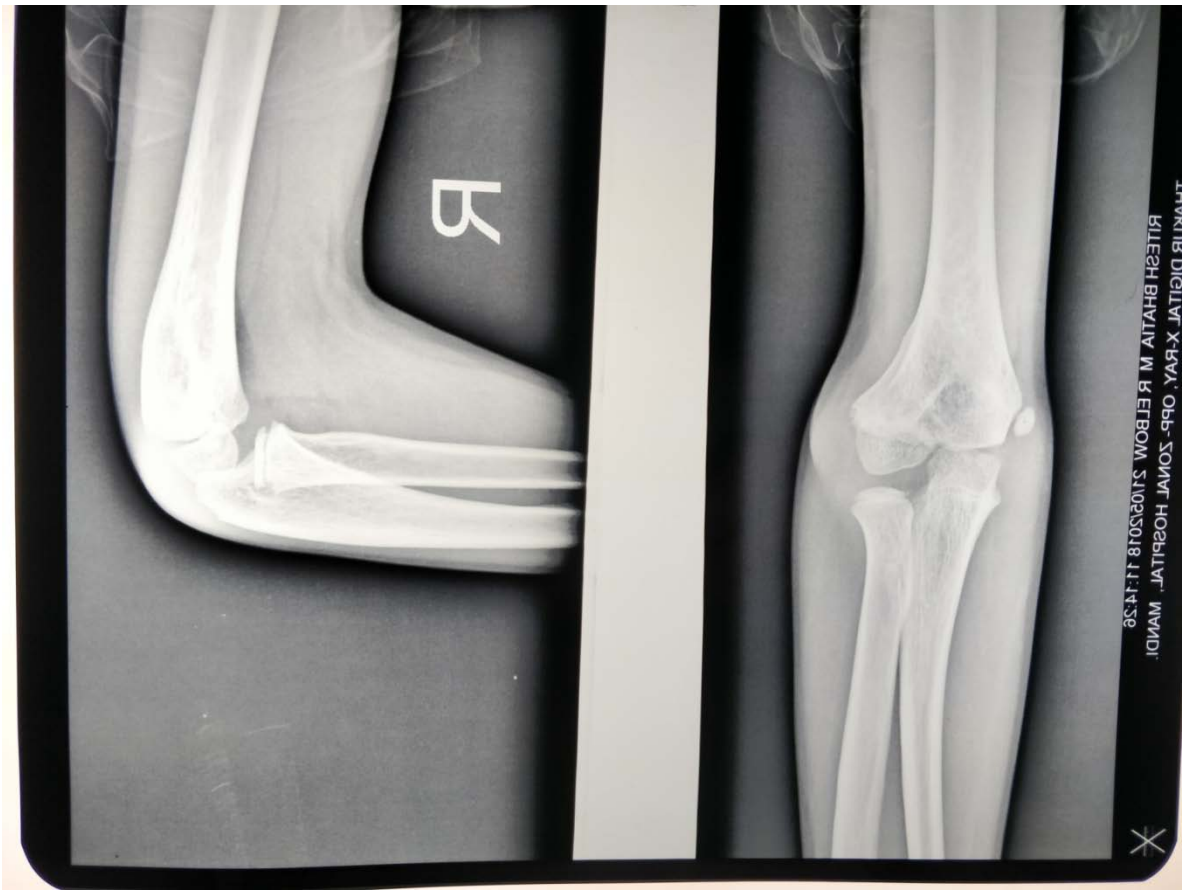

Figure 7: Radiographs at final follow up

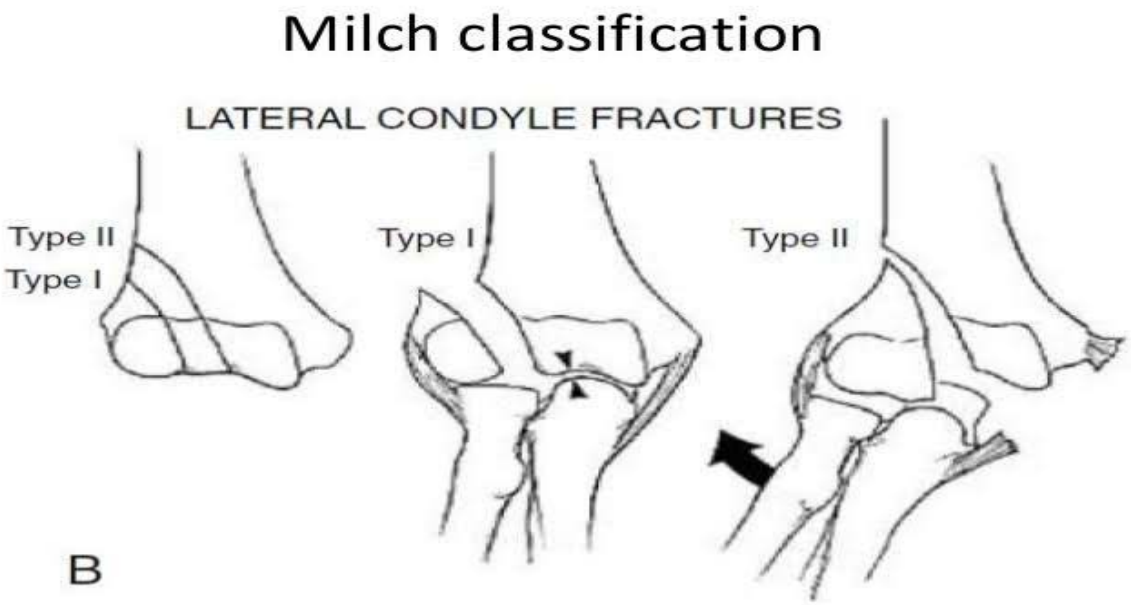

Figure 8: Milch classification

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Global Journal of Medical Research: H
Orthopedic and Musculoskeletal System
Volume 19 Issue 2 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Bilateral Atypical Femoral Fractures after Prolonged Bisphosphonate Therapy: A Case Report and New Approach to the Management of Iatrogenic Fractures

By Joseph Maalouly M.D., Dany Aouad M.D., Murielle Feghaly, Cynthia Habib & Georges El-Rassi M.D

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Abstract- Atypical femoral fractures (AFFs) are defined as atraumatic fractures of the femoral diaphysis and are known to be a complication of prolonged bisphosphonate (BP) therapy. Surgical treatment of AFFs consists of intramedullary (IM) nailing. We report the case of a 58-year-old female patient who presented with bilateral femoral fractures after 12 years of BP therapy. Surgical management using IM nails resulted in iatrogenic fractures of the femoral shaft in both limbs. We therefore, opted for conservative treatment, where a non-weight bearing protocol was implemented. Healing was then observed after six months of follow-up.

Keywords: *atypical femoral fractures, bisphosphonate, alendronate, ibandronate, osteoporosis.*

GJMR-H Classification: *NLMC Code: WI 965, WE 185*

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Abstract- **Atypical femoral fractures (AFFs) are defined as atraumatic fractures of the femoral diaphysis and are known to be a complication of prolonged bisphosphonate (BP) therapy. Surgical treatment of AFFs consists of intramedullary (IM) nailing. We report the case of a 58-year-old female patient who presented with bilateral femoral fractures after 12 years of BP therapy. Surgical management using IM nails resulted in iatrogenic fractures of the femoral shaft in both limbs. We therefore, opted for conservative treatment, where a non-weight bearing protocol was implemented. Healing was then observed after six months of follow-up.**

Keywords: atypical femoral fractures, bisphosphonate, alendronate, ibandronate, osteoporosis.

I. Background

Atypical femoral fractures (AFFs) are a newly defined concept. After the emergence of several cases that linked the prolonged bisphosphonates (BP) use to atypical femoral fractures [1,2,3], the American Society of Bone and Mineral Research (ASBMR) appointed a multidisciplinary team of experts to define AFFs [4]. AFFs were defined as low-intensity or atraumatic fractures of the femoral diaphysis, meeting at least four of the five major features described by the 2013 ASBMR task force[5]. These features were dependent on the mechanism of occurrence of the fracture (should be atraumatic or with minimal trauma), the location (fracture should be transverse, originating from the lateral cortex), the classification (non or minimally comminuted), and the radiological description (fracture site showing evidence of endosteal or periosteal thickening). The major features also discerned complete fractures that extended through the two bone cortices and were found to be associated with a medial spike from incomplete fractures that only involved the lateral cortex.

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There are very few studies, most with small samples[6,7,8,9,10] that have examined different surgical options for the management of AFFs. Most authors agree that IM nailing is the best treatment option. For instance, Das De et al.[7] recommended fixation with a full-length intramedullary (IM) nail and partial to full weight-bearing post-op for the management of diaphyseal fractures of the femur. Other studies opted for extramedullary devices and post-op wheelchair mobilization or partial weight-bearing[10] for the management of AFFs. These studies [8,10] report complication rates up to 63% [10] with the main complications being the need for revision surgery, implant failure or need for bone grafting.

In the absence of set recommendations and guidelines for the management of AFFs, we report a case of bilateral AFFs treated by IM nailing. This case was, however, complicated by iatrogenic bilateral femoral shaft fractures which were managed by a more conservative approach: non-weight bearing protocol with regular follow-ups and assessment.

II. Case Report

A 58-year-old postmenopausal female patient presented to our clinic complaining of a one-year history of bilateral thigh pain that was persistent and more pronounced on the right. The patient denied any history of trauma or fall. She reported having severe osteoporosis for which she had taken alendronate for ten years followed by ibandronate for the last two years. Her history is also significant for hypertension and dyslipidemia.

X-rays done following her visit showed evidence of bilateral, non-displaced, mid-diaphyseal femoral fractures with cortical thickening (Fig.1). After stopping ibandronate, a plan for separate IM nailing of the fractures was set, starting with the right side then followed by the left.

During the right femoral shaft fracture repair, the patient was placed on an orthopedic traction table. Preparation of insertion site over greater trochanter after which a guidewire was inserted, followed by reaming. Then an IM nail of 12mm in diameter, without

complications, was inserted in the medullary canal with the help of a hammer. During the insertion of the nail, a trochanteric fracture was noticed. Distal locking was obtained by using two 4 mm screws, which were prepared by 3.5mm drilling. Upon their insertion we noticed the occurrence of an iatrogenic fracture in the femur. X-ray imaging by C-arm of the right femur done post-op revealed that iatrogenic fracture had occurred, involving the proximal third of the shaft and the lower half of the anterior cortex of the greater trochanter (Fig. 2). We opted for a nonoperative treatment because we believe that any surgical treatment may result in more devascularization. The patient was discharged home after a short and uncomplicated post-op stay on a supportive, non-weight bearing protocol and a follow-up every three weeks with serial X-rays. Partial weight bearing at four months post-op was initiated after the patient became pain-free.

After six months of follow-up (Fig. 3), the patient showed significant clinical improvement, and imaging showed complete healing of the fractures.

After allowing an adequate recovery period, the patient was re-admitted for the management of her left femoral fracture. IM gamma nail was inserted with proximal fixation with a cephalomedullary screw. Distal fixation using two 4 mm screws was attempted, but the left femur showed evidence of iatrogenic fractures upon insertion of the screws (Fig.4). We used a 3.2mm drill to insert the 4 mm screws. The same protocol was followed again, with the patient discharged on a supportive, non-weight bearing protocol and a scheduled follow-up every three weeks. After five months of follow-up, the patient exhibited significant clinical improvement with return to normal activity and was pain-free. At six months follow up imaging showed complete healing of the fractures (Fig.5).

III. Discussion

In this study, we report a case of bilateral AFFs after prolonged BP use complicated by iatrogenic bilateral femoral shaft fractures upon IM nail insertion. These fractures were managed conservatively by putting the patient on non-weight bearing protocol with follow up imaging and assessment every three weeks.

The physiopathology of AFF after BP use is well described in the literature.

After BP use, femoral diaphyseal AFF is the most common. BP reduces the dissolution of hydroxyapatite, resulting in inhibition of osteoclasts and inhibiting bone resorption[11]. As a result, accumulation of micro-damage occurs[12] and the maturation of collagen is prevented[13]. They have also been reported to increase mineralization [14,15] and increase advanced glycated end-products[16].

The recommended surgical approach is IM nailing[7,17,18] while other approaches include extramedullary devices[10] have been reported. Kharwadkar et. al. reported that fractures managed with IM nailing achieved better healing since they heal by endochondral ossification while extramedullary approaches such as the use of plate and screws would result in delayed healing especially due to their placement on the lateral side of the femoral shaft which would result in the absence of load sharing[18]. Similarly, Lee K.J et al. reported that IM nailing of AFFs resulted in a complete bony union in 95.7% of their cases with only two patients requiring revision surgery[18].

We report the case of a 58y.o female patient that presented with bilateral femoral fractures, consecutive management of the fractures by IM nailing starting with the right side followed by the left was performed. On the right, we had a fracture which is unusual to happen in the normal population since the standard technique has been used. Possibly, in a similar patient we should over-ream and medialize the insertion of the nail. Then, the nail should be inserted without the aid of a hammer.

On the left side, the distal locking 4 mm screw was placed in the static hole which was drilled with a 3.2 mm mesh. Perhaps the diameter of the drill was not big enough; maybe tapering should have been used. A 100% concentric drilling that may create more stress than usual during insertion.

In both cases, we have to introduce carefully the nail and screws with proper positions, drilling, tapering, and sizing.

In the absence of recommendations around the management of iatrogenic fractures in BP exposed bones, a non-weight bearing protocol was opted for, with patient assessment and follow up with imaging every two weeks was attempted. The decision to not re-operate was based on the fact that the healing process would have already started. Present literature shows evidence of delayed healing in BP users, as BP has been shown to delay the remodeling of the calcified cartilage callus formed during the initial phases of healing to mature bone[19]. Therefore, we relied on the natural healing process and patient cooperation with minimal activity and non-weight bearing. After six months from the first fracture and six months from the second, radiological and clinical evaluation showed, indeed, evidence of complete healing. For instance, Thompson et al. reported that 22 patients with 24 fractures required on average six months to achieve union of the fractures with two patients needing one year to achieve full union after surgical repair[20]. Likewise, in a study conducted by Lee et al. [18], of the 46 femoral fractures included in the study, only 63% healed within six months with the rest necessitating up to 12 months for complete recovery.

IV. Conclusion

We report a case of bilateral iatrogenic femoral shaft fractures upon IM nailing for the management of bilateral AFFs after prolonged exposure to BP. After opting for a conservative approach, these fractures showed evidence of complete radiologic and clinical healing within six months on the right side and six months on the left side similar to previous studies which reported an average of six to 12 months to achieve fracture healing. Based on this case and previous literature, surgical management of AFFs with IM gamma nailing with cephalomedullary nailing for proximal fixation and two transverse screws for distal fixation is preferred. Since BP render bones very fragile, reaming to measures beyond those used for normal bones should be done to avoid iatrogenic fractures. Also, patients, as well as physicians, should be made aware of the possibility of occurrence of AFFs as a complication of prolonged use of BP and the presence of alternative choices such as calcium and vitamin D or teriparatides for the long-term management of osteoporosis.

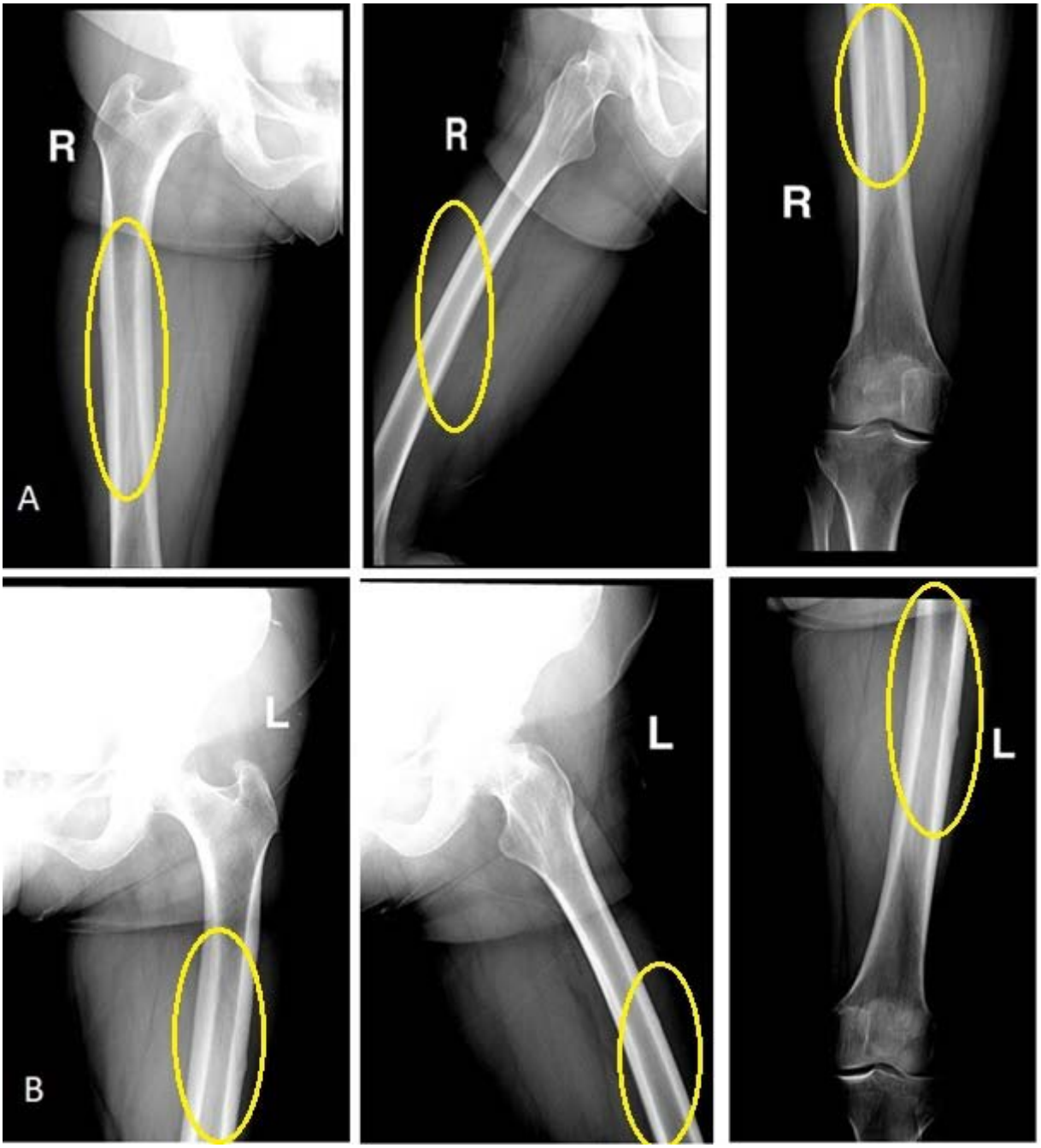

Figure 1: A 58-year-old female patient presenting with bilateral femoral fractures; *A:* Right femur, *B:* Left femur

Figure 2: X-ray of the right femur on day 0 post-op showing an iatrogenic fracture of the proximal third of the femoral shaft

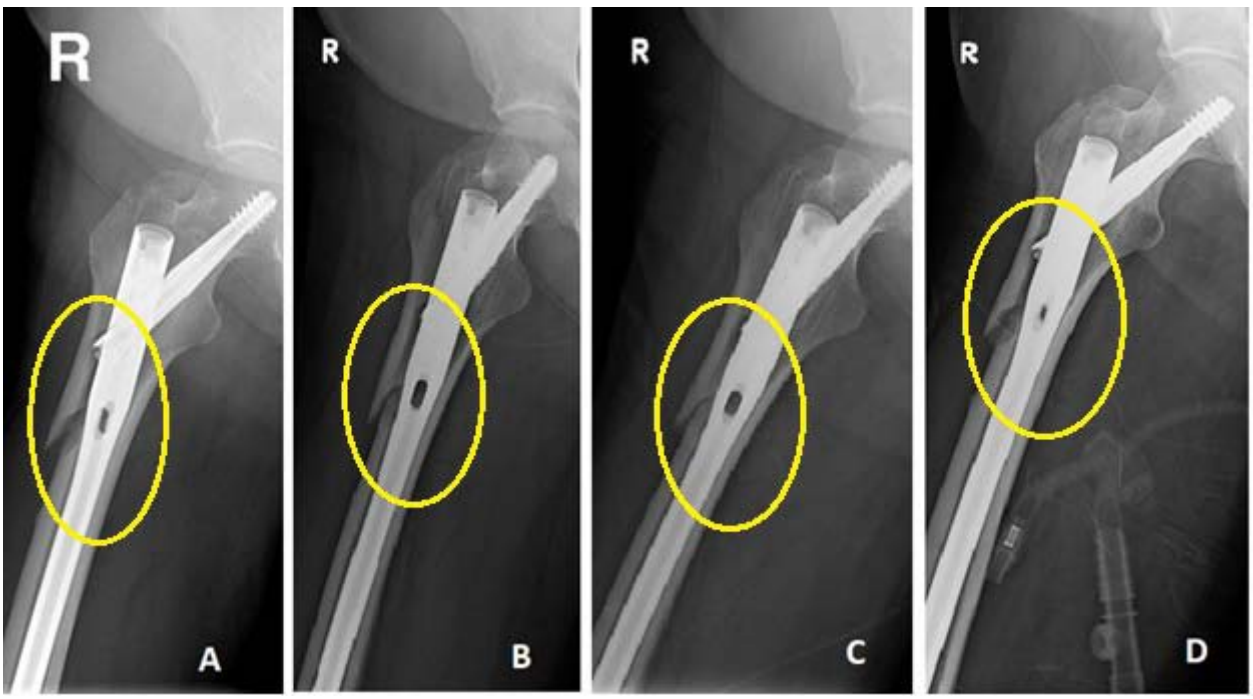

Figure 3: X rays of the right femur; *A:* week 3, *B:* week 6, *C:* week 12, *D:* week 15.

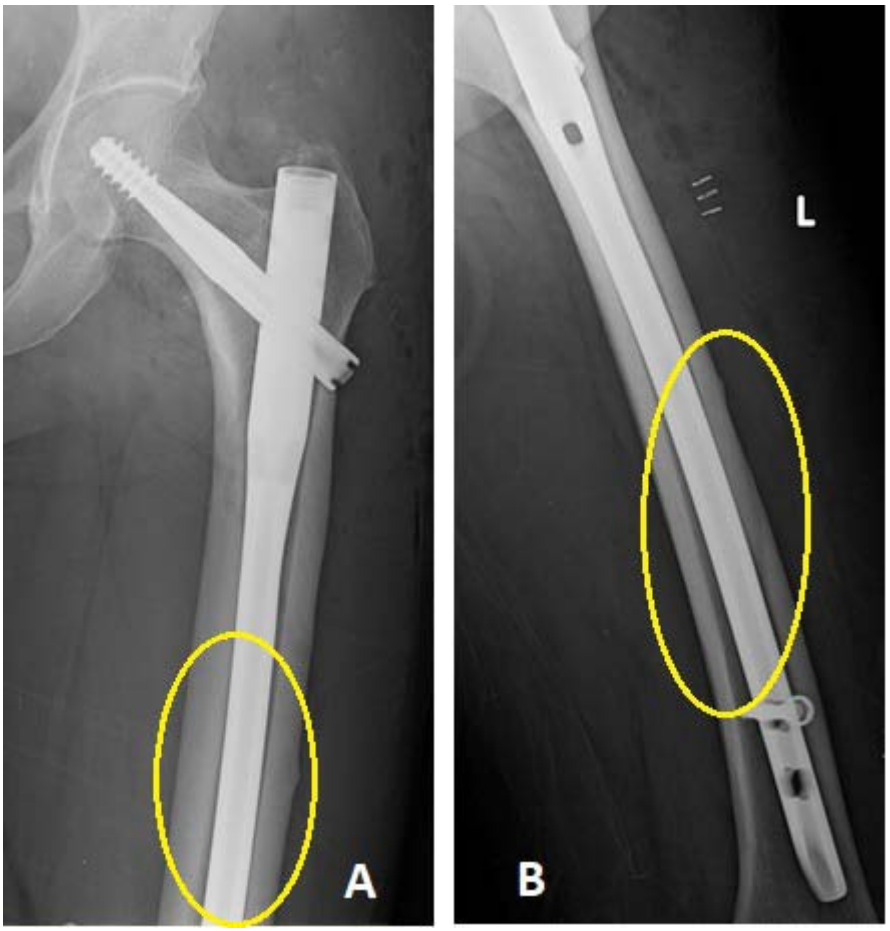

Figure 4: *A, B:* X rays of the left femur on day 0 post-op showing an iatrogenic fracture of the distal third of the femoral shaft

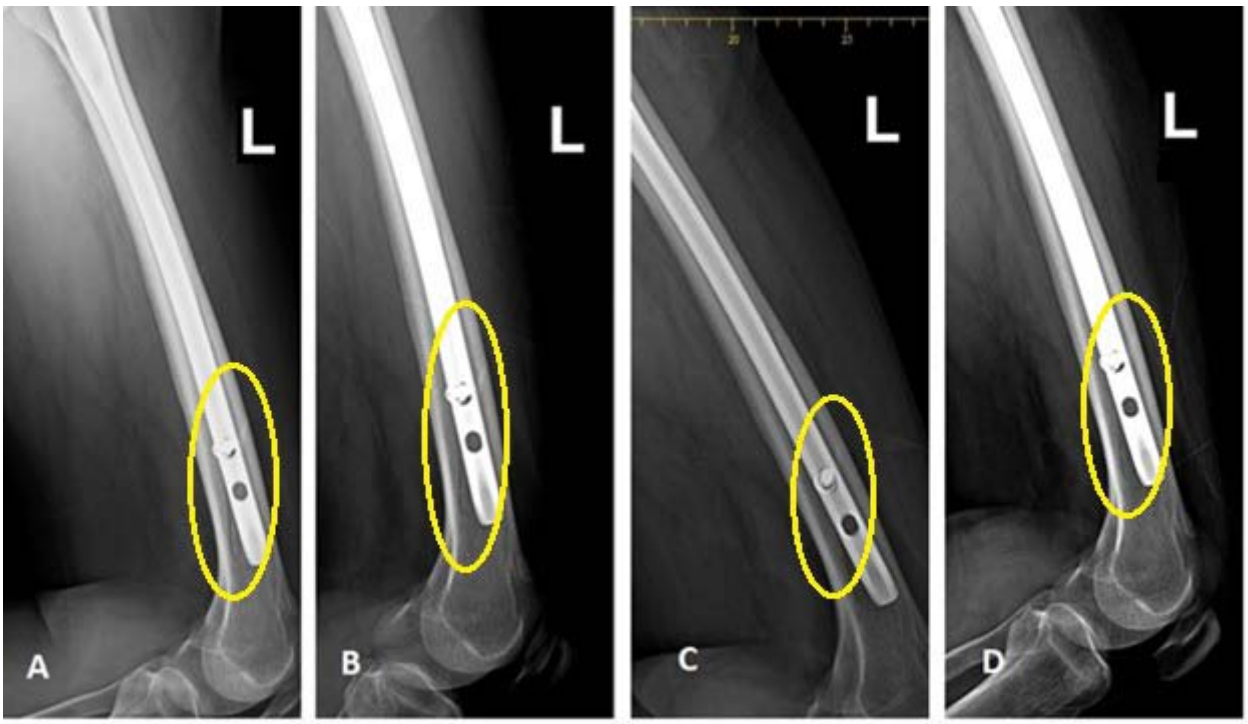

Figure 5: X rays of the left femur; *A:* week 6, *B:* week 10, *C:* week 16, *D:* week 23.

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Global Journal of Medical Research: H
Orthopedic and Musculoskeletal System
Volume 19 Issue 2 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Outcomes of Lateral Column Plating in Extra-Articular Distal Humerus Fracture

By Dr. Anuj Induprakash Gajbhiye, Dr. R Dorai Kumar & Dr. Mohan Choudhary

Abstract- *Background:* Distal humerus extra-articular fractures are rare injuries conventionally fixed with stable bi-columnar fixation. It requires extensive soft tissue stripping leading to delayed recovery, and Olecranon impingement as a frequent complication hampering elbow extension; without considering the damage caused by excessive soft tissue stripping, both intra-articular and extra-articular fractures are managed in the same way. In extra-articular distal humerus fractures it's not needed, and additional soft tissue stripping, olecranon impingement or need of olecranon osteotomy is eliminated by using single lateral column plate. The purpose of this study is to evaluate the clinical, functional and radiological outcome of lateral column plating in distal humerus extra-articular fractures in relation to patient benefits. With recent advances in the field of implant manufacturing, and their availability: single column plate with better strength, and designs are promising enough to provide equivalent fracture stabilization (7) (8), avoids olecranon impingement/osteotomy; with less surgical exposure, thereby helping in quicker recovery, and reduced rehabilitation time.

Keywords: *lateral column plate, distal humerus, extra-articular fractures, single column plate.*

GJMR-H Classification: *NLMC Code: WE 175*

Strictly as per the compliance and regulations of:

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Dr. Anuj Induprakash Gajbhiye [α], Dr. R Dorai Kumar [σ] & Dr. Mohan Choudhary [ρ]

Abstract- *Background:* Distal humerus extra-articular fractures are rare injuries conventionally fixed with stable bi-columnar fixation. It requires extensive soft tissue stripping leading to delayed recovery, and Olecranon impingement as a frequent complication hampering elbow extension; without considering the damage caused by excessive soft tissue stripping, both intra-articular and extra-articular fractures are managed in the same way. In extra-articular distal humerus fractures it's not needed, and additional soft tissue stripping, olecranon impingement or need of olecranon osteotomy is eliminated by using single lateral column plate. The purpose of this study is to evaluate the clinical, functional and radiological outcome of lateral column plating in distal humerus extra-articular fractures in relation to patient benefits. With recent advances in the field of implant manufacturing, and their availability: single column plate with better strength, and designs are promising enough to provide equivalent fracture stabilization (7) (8), avoids olecranon impingement/osteotomy; with less surgical exposure, thereby helping in quicker recovery, and reduced rehabilitation time.

Materials and Methods: It's a prospective study conducted at Sri Ramachandra hospital during April 2015, and August 2017; and consisted of Twenty (20) patients of which one (1) was lost during follow-up, and thus nineteen (19) patients were available for final assessment. The Distal humerus extra-articular fractures were classified using the AO/ ASIF Classification. After the surgery, functional evaluation was done with DASH, MAYO, VAS score, and radiographic analysis at follow-up period starting from 6 weeks to 1year.

Result: Nineteen patients of distal humerus extra-articular fractures treated with distal humerus extra-articular plating were followed periodically from 6 weeks upto one year. Flexion movement was good throughout follow-up, and was statistically significant from 6 week to 3 months; 6 week to 6 months, 6 week to 1 year, 3 month to 6 months, 3 month, 1 year respectively, and was not significant at 6 month - 1 year. That means the patient had almost recovered by 6 weeks follow-up; little improvement was there up to 1 year from the initial time of the follow-up. When compared with the last 6 month of follow-up, there was no further improvement possible as the patient had already achieved there anatomical range of movement. The extension was significantly improved when the patient came for follow-up at 6 weeks, and mean extension was 3.68 ± 6 degrees. Later at 3, 6 months, and 1 year where an almost normal extension was possible in all cases except complicated cases; thus there was no scope of further extension at latter visits, and test were insignificant statistically. Supination was not statistically significant at any follow-ups. That means the patient had recovered to an anatomical range of movement by 6 weeks of follow-up, and there was no further improvement possible. Pronation was not statistically significant at any follow-ups. That means the patient had recovered to an anatomical range of movement by 6 week follow-up, and there was no further improvement possible. Dash score was decreasing over one year. The score was compared at 6 weeks to 3 month, 6 month, and 1 year respectively; at 3 month to 6 month, 1 year respectively, and at 6 month to 1 year. All intervals were statistically significant ($p < 0.05$) indicating improvement in patients daily activities to normal over 1 year. Mayo score was increasing over the period of one year. The score was compared; At 6 weeks to 3 month, 6 month, 1 year respectively; 3 month to1 year; and at 6 month to 1 year. All intervals were statistically significant ($p < 0.05$) except at 3 month - 6 month period where it was statistically insignificant due to one case of malunion, and implant failure. Otherwise, all patients recovered to almost normal over 1 year. VAS score was minimal at 6 weeks, and was decreasing at later follow-ups. It was found to be significant at 6 weeks i.e. patient were relived of pain by 6 weeks to 3 months. Later it was marginally significant at 6 months, but it was due to a case of implant failure that came up with aggrieved pain complaints. Otherwise; in other patient's it was insignificant after 3 months as patients were relived of pain, and there was no scope for any further pain relief. The mean metaphyseal-diaphyseal angle was 86.21° (SD3.441°, normal 82–84°), the mean humeral-ulnarangle was 14.63° (SD 2.338°, normal 17.8° valgus), and the mean shaft-condylar angle was 39.84° (SD 1.500°, normal 40°). The anterior humeral line passed through 50.00 % (SD 1.491 %) of the capitellar width (normal, middle third). One patient had implant failure, which was treated by implant exit, and revision lateral column distal humerus plating.

Conclusion: Extra-articular distal humerus fractures fixed with lateral column plate resulted in good immediate stability, and fracture union with quick recovery, and improved satisfaction to the patient.

Keywords: lateral column plate, distal humerus, extra-articular fractures, single column plate.

I. Introduction

Distal humerus extra-articular fractures comprise 16% of humerus fractures, and 10% of distal humerus fractures (1) (2). Conventionally all distal humerus fractures are stabilized with bi-columnar plating. It is a stable fixation but requires extensive soft tissue stripping leading to delayed recovery, and Olecranon impingement as a frequent complication hampering elbow extension; without considering the damage caused by excessive soft tissue stripping, both intra-articular and extra-articular fractures are managed

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in the same way. In extra-articular distal humerus fractures it's not needed, and additional soft tissue stripping, olecranon impingement or need of olecranon osteotomy is eliminated by using single lateral column plate (1) (3) (4) (5) (6). With recent advances in the field of implant manufacturing, and their availability: single column plate with better strength and designs are promising enough to provide equivalent fracture stabilization (7) (8), avoids olecranon impingement/ osteotomy; with less surgical exposure, thereby helping in quicker recovery, and reduced rehabilitation time. Lateral column plating in extra-articular distal humerus fractures, is a surgical procedure in which fracture is reduced by open anatomical reduction, and fixed with single lateral plate to posterior surface of humerus to restore mechanical axis, stability of the bone and restore joint configuration (3) which will further enhance the function of the muscles, ligaments , and other soft tissue structures of the elbow joint with minimal soft tissue stripping, completely eliminating olecranon impingement, and thus aid in early mobilisation.

II. Material & Methods

It was a Prospective study conducted at Sri Ramachandra Medical College & Research Institute, Chennai during April 2015 and August 2017. The study consisted patients of closed injury with distal humerus extra-articular fractures in skeletally mature patients, and excluded intra-articular fractures of elbow, paediatric age group, proximal humerus fractures, previously - treated or operated with other internal fixation methods/devices but failed, open injuries, and patients having a pre-operative neuro-vascular deficit. Preoperatively patients were evaluated clinically, radiologically and the diagnosis was established and classified using the AO/ASIF Classification. Twenty (20) patients of distal humerus extra-articular fractures were at hand of which Nineteen (19) were available for final assessment. Our follow-up period ranges from 6 weeks to 1 year. The Implant used was LCP Extra-articular Distal Humerus Plate, which is anatomically shaped, and angular stable fixation system for extra-articular fractures fixation of the distal humerus. The LCP head is tapered to minimize soft tissue irritation; five distal locking holes accept 3.5 mm locking screws, all head holes are angled medially to maximize screw purchase in bone, two most distal holes are angled toward the capitulum, and trochlea. whereas in the Plate shaft Combi holes combine a dynamic compression unit (DCU) hole with a locking screw hole, providing the flexibility of axial compression, and locking capability throughout the plate shaft, Limited-contact design, Available with 4, 6, 8, 10, 12 or 14 elongated Combi holes to accommodate distal humerus fractures with shaft involvement (figure 1)

Figure 1

a) Surgical Protocol

General anesthesia was used for all cases. The patient is then positioned right or left lateral with arm hanging by the side depending upon the side. In our study, all 19 distal humerus were operated through posterior Triceps-Splitting Approach. (Figure 2 A) Where; Distal one-third of triceps is split longitudinally to olecranon process. At olecranon process, split continues longitudinally, with the elevation of triceps insertion sharply off bone medially, and laterally. Triceps is essentially split into medial and lateral halves and retracted peripherally, allowing visualization of the underlying distal humerus, FCU, flexor carpi ulnaris (Figure 2 A B C).

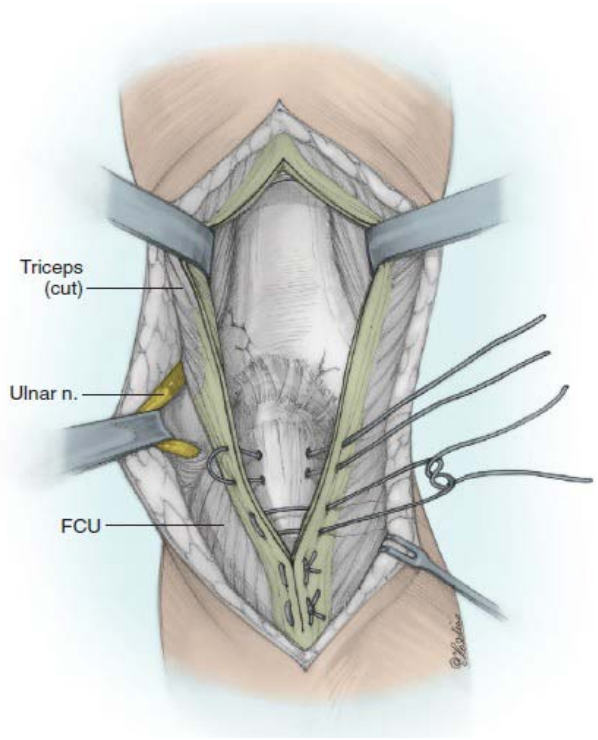

Figure 2 A

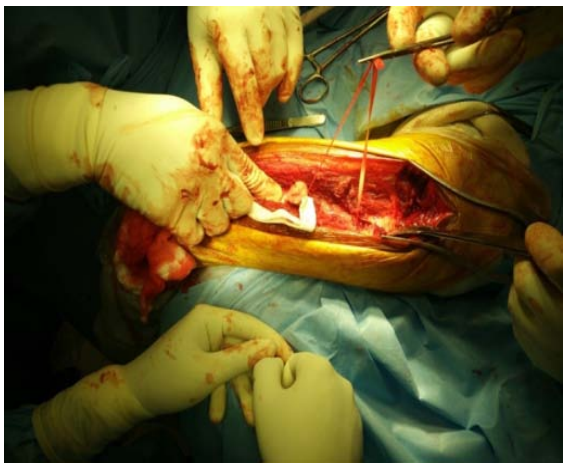

Figure 2 B

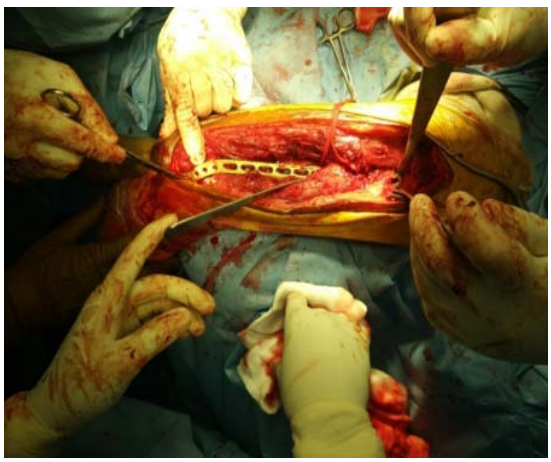

Figure 2 C

b) Postoperative Care, Rehabilitation, and Evaluation

The patient is nursed in absolute aseptic conditions in the postoperative ward with the limb in hanging position by pillow cover elevation. Parental antibiotics were continued for the first two days followed by oral antibiotics for the next three days. Pain management was done with intra-venous analgesic, and was removed on the 2nd post-operative day. There after oral analgesics were given. Drain is removed at the end of 48 hrs. As soon as pain subsides, Rehabilitation Protocol is started with physiotherapy. The Active elbow flexion-extension and supination-pronation exercises with the aim of maximum ranges of motion; as soon as possible but as tolerated by the patients. The patient was advised to continue exercises here or any other convenient centre. Sutures were removed during 12th to 14th post-operative day. After the surgery, functional evaluation was done with DASH, MAYO and VAS score (figure 3, 4, and 5) at six weeks, three months, six months, and one year.

Functional Evaluation of patients is done using the DASH and MAYO score and is categorized as:

MAYO: Excellent 100-90; Good 75-89; Fair 60-74; Poor below 60.

DASH: Excellent 0; Poor 100.

The Pain was assessed using VAS score: No pain 0; Worst pain10.

www.orthopaedicscores.com

Date of completion
October 10, 2017

The Disabilities of the Arm, Shoulder and Hand (DASH) Score

Clinician's name (or ref) _____ Patient's name (or ref _____

INSTRUCTIONS: This questionnaire asks about your symptoms as well as your ability to perform certain activities. Please answer *every question* , based on your condition in the last week. If you did not have the opportunity to perform an activity in the past week, please make your *best estimate* on which response would be the most accurate. It doesn't matter which hand or arm you use to perform the activity; please answer based on you ability regardless of how you perform the task.

Please rate your ability to do the following activities in the last week.

1. Open a tight or new jar	○ No difficulty	○ Mild difficulty	◉ Moderate difficulty	○ Severe difficulty	○ Unable
2. Write	○ No difficulty	○ Mild difficulty	○ Moderate difficulty	◉ Severe difficulty	○ Unable
3. Turn a key	○ No difficulty	◉ Mild difficulty	○ Moderate difficulty	○ Severe difficulty	○ Unable
4. Prepare a meal	○ No difficulty	◉ Mild difficulty	○ Moderate difficulty	○ Severe difficulty	○ Unable
5. Push open a heavy door	○ No difficulty	◉ Mild difficulty	○ Moderate difficulty	○ Severe difficulty	○ Unable
6. Place an object on a shelf above your head	○ No difficulty	◉ Mild difficulty	○ Moderate difficulty	○ Severe difficulty	○ Unable
7. Do heavy household chores (eg wash walls, wash floors)	○ No difficulty	○ Mild difficulty	◉ Moderate difficulty	○ Severe difficulty	○ Unable
8. Garden or do yard work	○ No difficulty	○ Mild difficulty	◉ Moderate difficulty	○ Severe difficulty	○ Unable
9. Make a bed	○ No difficulty	○ Mild difficulty	○ Moderate difficulty	◉ Severe difficulty	○ Unable
10. Carry a shopping bag or briefcase	○ No difficulty	○ Mild difficulty	○ Moderate difficulty	◉ Severe difficulty	○ Unable
11. Carry a heavy object (over 10 lbs)	○ No difficulty	○ Mild difficulty	○ Moderate difficulty	◉ Severe difficulty	○ Unable
12. Change a lightbulb overhead	○ No difficulty	○ Mild difficulty	◉ Moderate difficulty	○ Severe difficulty	○ Unable
13. Wash or blow dry your hair	○ No difficulty	○ Mild difficulty	◉ Moderate difficulty	○ Severe difficulty	○ Unable
14. Wash your back	○ No difficulty	○ Mild difficulty	◉ Moderate difficulty	○ Severe difficulty	○ Unable

Figure 3A

15. Put on a pullover sweater	○ No difficulty	○ Mild difficulty	○ Moderate difficulty	◉ Severe difficulty	○ Unable
16. Use a knife to cut food	○ No difficulty	○ Mild difficulty	○ Moderate difficulty	○ Severe difficulty	◉ Unable
17. Recreational activities which require little effort (eg cardplaying, knitting, etc)	○ No difficulty	○ Mild difficulty	○ Moderate difficulty	◉ Severe difficulty	○ Unable
18. Recreational activities in which you take some force or impact through your arm, shoulder or hand (eg golf, hammering, tennis, etc)	○ No difficulty	○ Mild difficulty	○ Moderate difficulty	◉ Severe difficulty	○ Unable
19. Recreational activities in which you move your arm freely (eg playing frisbee, badminton, etc)	○ No difficulty	○ Mild difficulty	◉ Moderate difficulty	○ Severe difficulty	○ Unable
20. Manage transportation needs (getting from one place to another)	○ No difficulty	○ Mild difficulty	◉ Moderate difficulty	○ Severe difficulty	○ Unable
21. Sexual activities	○ No difficulty	○ Mild difficulty	○ Moderate difficulty	◉ Severe difficulty	○ Unable
22. During the past week, *to what extent* has your arm, shoulder or hand problem interfered with your normal social activities with family, friends, neighbours or groups?	○ Not at all	○ Slightly	○ Moderately	◉ Quite a bit	○ Extremely
23. During the past week, were you limited in your work or other regular daily activities as a result of your arm, shoulder or hand problem?	○ Not limited at all	○ Slightly limited	◉ Moderately limited	○ Very limited	○ Unable
Please rate the severity of the following symptoms in the last week					
24. Arm, shoulder or hand pain	○ None	○ Mild	◉ Moderate	○ Severe	○ Extreme
25. Arm, shoulder or hand pain when you performed any specific activity	○ None	○ Mild	○ Moderate	○ Severe	◉ Extreme
26. Tingling (pins and needles) in your arm, shoulder or hand	○ None	○ Mild	○ Moderate	◉ Severe	○ Extreme
27. Weakness in your arm, shoulder or hand	○ None	○ Mild	○ Moderate	◉ Severe	○ Extreme
28. Stiffness in your arm, shoulder or hand	○ None	○ Mild	○ Moderate	○ Severe	◉ Extreme
29. During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand?	○ No difficulty	○ Mild difficulty	○ Moderate difficulty	◉ Severe difficulty	○ So much I can't sleep
30. I feel less capable, less confident or less useful because of my arm, shoulder or hand problem	○ Strongly disagree	○ Disagree	○ Neither agree nor disagree	○ Agree	◉ Strongly agree

Thank you very much for completing all the questions in this questionnaire.

Figure 3B

Mayo Elbow Performance Score

Clinician's name (or ref) ..... Patient's name (or ref) .....

Please answer the following questions.

Section 1 - Pain Intensity
○ None
○ Mild
○ Moderate
○ Severe

Section 2 - Motion
○ Arc of motion greater than 100 degrees
○ Arc of motion between 50 and 100 degrees
○ Arc of motion less than 50 degrees

Section 3 - Stability
○ Stable
○ Moderate instability
○ Grossly Unstable

Section 4 - Function (Tick as many as able)
○ Can comb hair
○ Can eat
○ Can perform hygiene
○ Can don shirt
○ Can don shoe

Figure 4

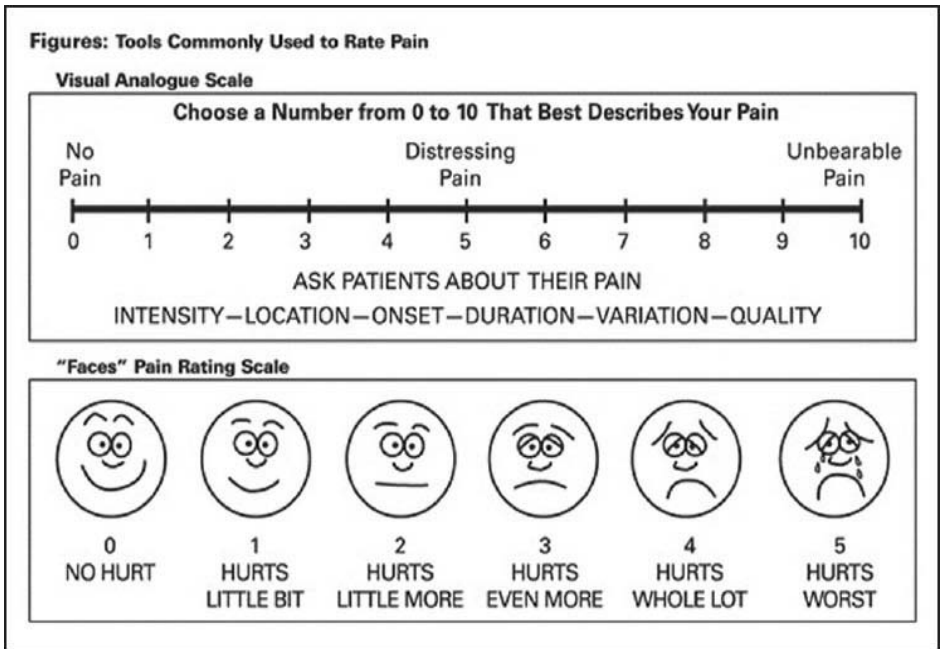

Figure 5

c) Radiographic Analysis

Antero-posterior and lateral radiographs were done at each visit, compared with previous radiographs, and analysed for Metaphyseal diaphysis angle, humeral ulnar angle, shaft condylar angles, anterior humeral line (Figure 6) , Plate location, Stability , and Sign of healing (post 6 weeks). Also, radiolucent lines, changes in bone density, cortical hypertrophy and heterotrophic ossification if any were noted. Healing of fracture was examined by observing cortical continuity,

disappearance of fracture lines and appearance of bridging bone in all planes. Extensive reactive lines around bone contact surface of the implant were considered a major sign for the absence of Osseo-integration. Clinically healing was established by absence of pain, tenderness or abnormal mobility.

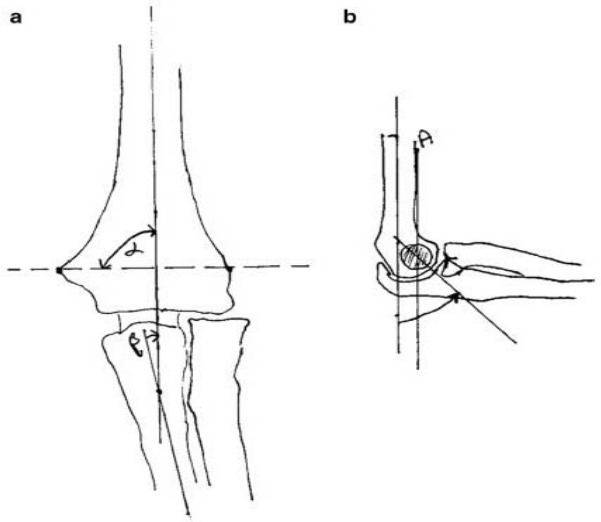

Figure 6: Elbow antero-posterior and lateral radiographs

On Ap View (Fig 6.A):
Metaphyseal-diaphyseal angle (α)
Humeral-ulnar angle (β)

On lateral view (Fig 6.B):
Anterior humeral line (A)
Shaft condyle angle (arrow)

III. Results

20 Cases were identified for this study, of which one (1) was lost during follow-up thus 19 cases (10 males, and 9 females) with bimodal distribution of age – where in 20-40 age group had most cases, most common cause being RTA followed by 60-80 as old age were available for final assessment. According to AO/ASIF classification 63.2% patients belong to AO type A2 type, and 36.8% belong to AO type A3 fracture.

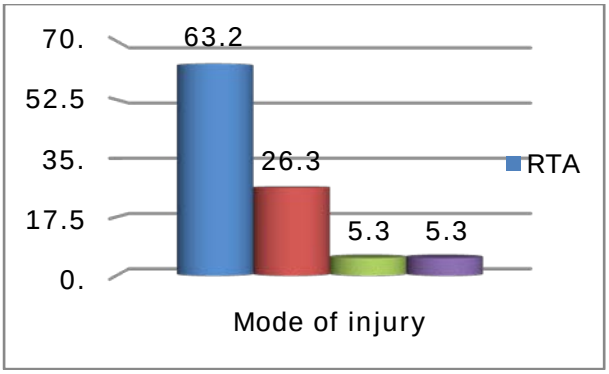

Figure 7

Road traffic accident was the major cause of injury 63.2%; followed by slip and fall 26.3%, one case of pathological (5.3%), and sports injury (5.3%) each.

Table 1: Radiological Analysis

	N	Minimum	Maximum	Mean	Std. Deviation
Metaphyseal diphyseal angle	19	82	91	86.21	3.441
Humeral ulnar angle	19	12	18	14.63	2.338
Shaft condylar angles	19	38	42	39.84	1.500
Anterior humeral line	19	48	52	50.00	1.491

The mean metaphyseal-diaphyseal angle was 86.21° (SD3.441°, normal 82–84°), the mean humeral-ulnar angle was 14.63° (SD 2.338°, normal 17.8° valgus), and the mean shaft-condylar angle was 39.84° (SD 1.500°, normal 40°). The anterior humeral line passed through 50.00 % (SD 1.491 %) of the capitellar width (normal, middle third).

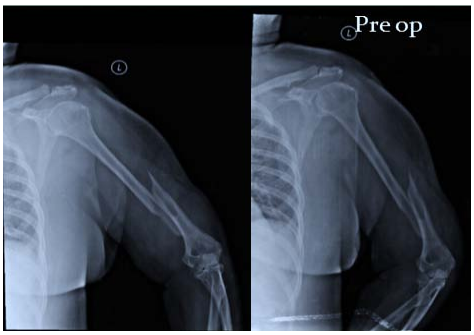

Figure 8 A

Figure 8 B

Figure 8 C

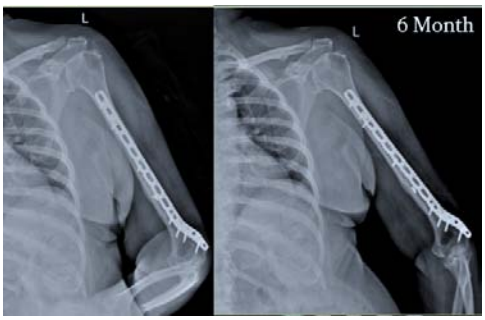

Figure 8 D

Figure 8 E

a) *Clinical illustration*

Figure 9: A/B Flexion and extension

Figure 9: C/D Supination and pronation

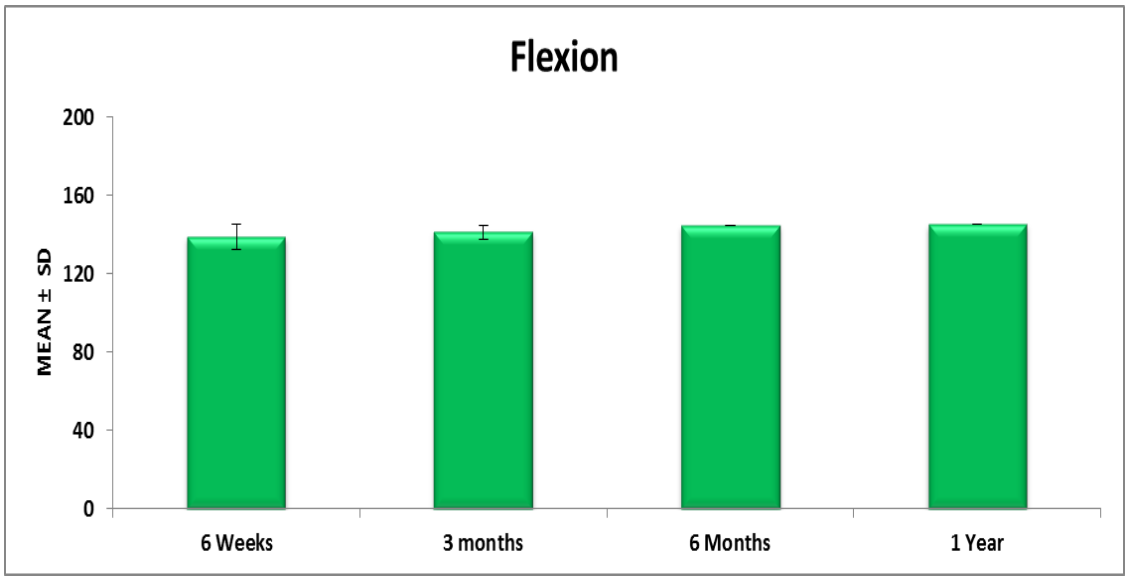

Figure 10

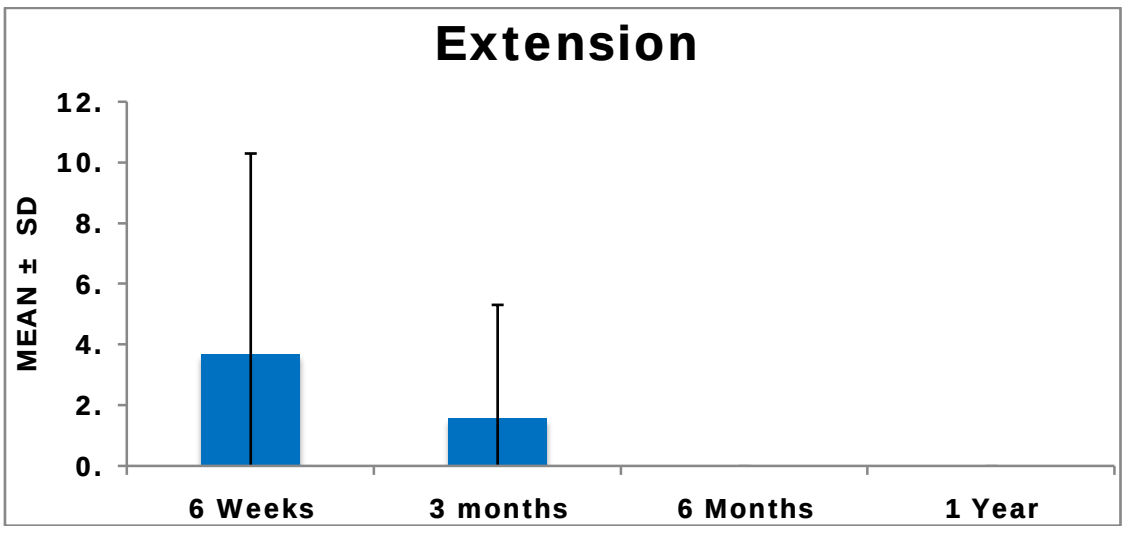

Figure 11

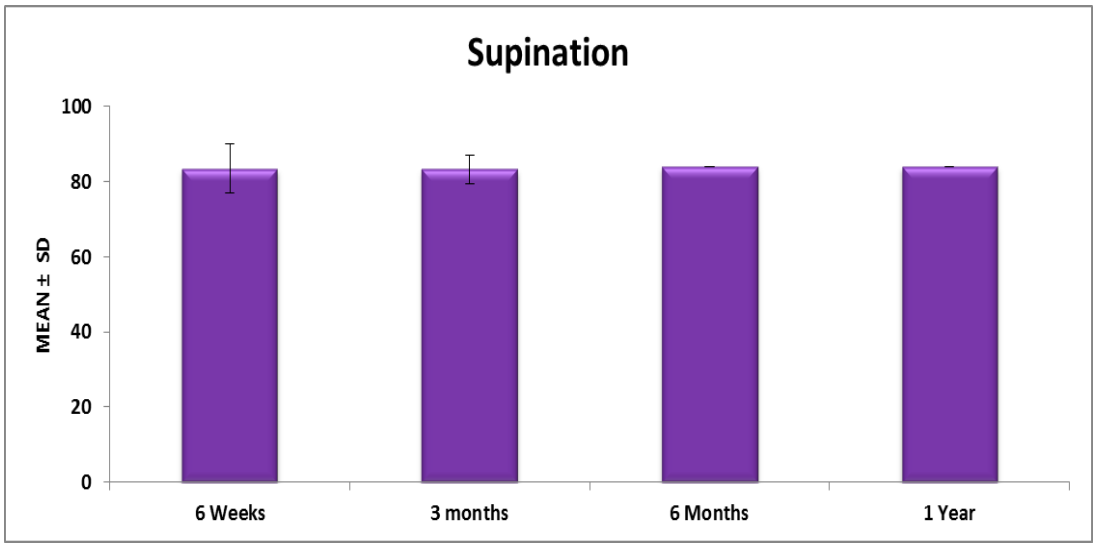

Figure 12

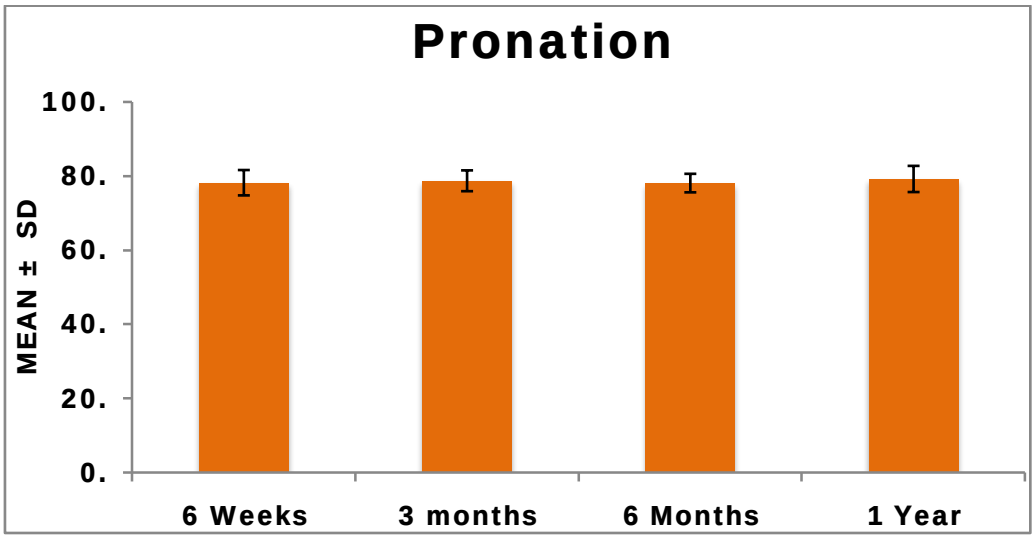

Figure 13

Flexion movement was good throughout follow-up, and was statistically significant from 6 weeks to 3 month; 6 week to 6 month, 6 week to 1 year, 3 month to 6 month, 3 month, 1 year respectively, and was not significant at 6 month - 1 year. That means patient had almost recovered by 6 week follow-up, little improvement was there up to 1 year from initial time of follow-up. When compared with last 6 month of follow-up there was no further improvement possible as patient had already achieved there anatomical range of movement (Figure 10). The extension was significantly improved when the patient came for follow-up at 6 weeks, and mean extension was 3.68 ± 6 degrees. Later at 3, 6 months and 1 year where almost normal extension was possible in all cases except complicated cases; thus there was no scope of further extension at latter visits, and test were insignificant statistically (Figure 11). Supination was not statistically significant at any follow-ups. That means the patient had recovered to an anatomical range of movement by 6 week of follow-up, and there was no further improvement possible (Figure 12). Pronation was not statistically significant at any follow-ups. That means the patient had recovered to the anatomical range of movement by 6 week follow-up, and there was no further improvement possible (Figure 13). Dash score was decreasing over one year. The Score was compared at 6 weeks to 3 month, 6 month, and 1 year respectively; at 3 month to 6 month, 1 year respectively, and at 6 month to 1 year. All intervals were statistically significant ($p<0.05$) indicating improvement in patients daily activities to normal over 1 year (Figure 14). Mayo score was increasing over a period of one year. The score was compared; At 6 weeks to 3 month, 6 month, 1 year respectively; 3 month to 1 year;, and at 6 month to 1 year. All interval were statistically significant ($p <0.05$) except at 3 month – 6 month period where it was statistically insignificant due to one case of malunion, and implant failure. Otherwise,

all patients recovered to almost normal over 1 year (Figure 15). VAS score was minimal at 6 weeks, and was decreasing at later follow-ups. It was found to be significant at 6 weeks i.e. patient were relived of pain by 6 weeks to 3 months. Later it was marginally significant at 6 months but it was due to case of implant failure that came up with aggrieved pain complaints. Otherwise; in other patient's it was insignificant after 3 months as patients were relived of pain, and there was no scope for any further pain relief (Figure 16).

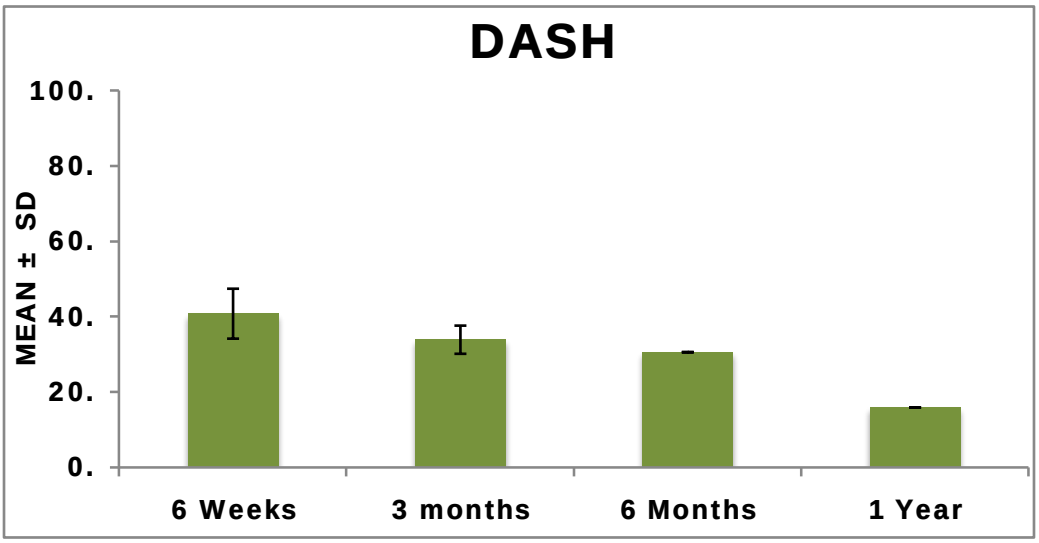

Figure 14

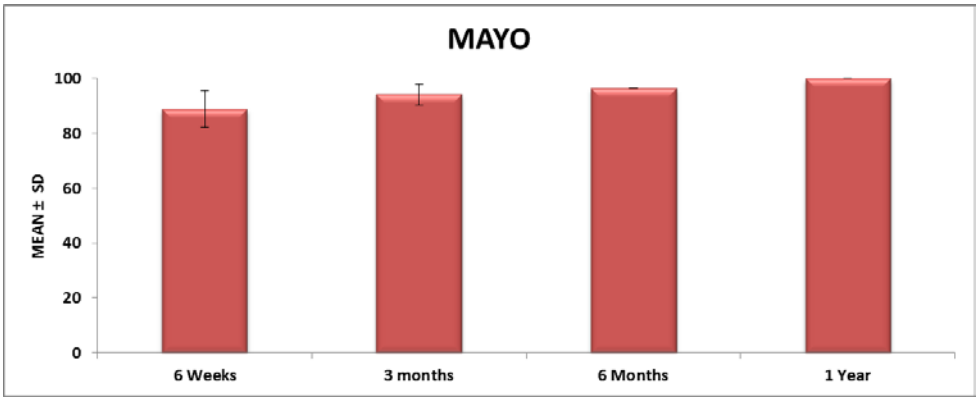

Figure 15

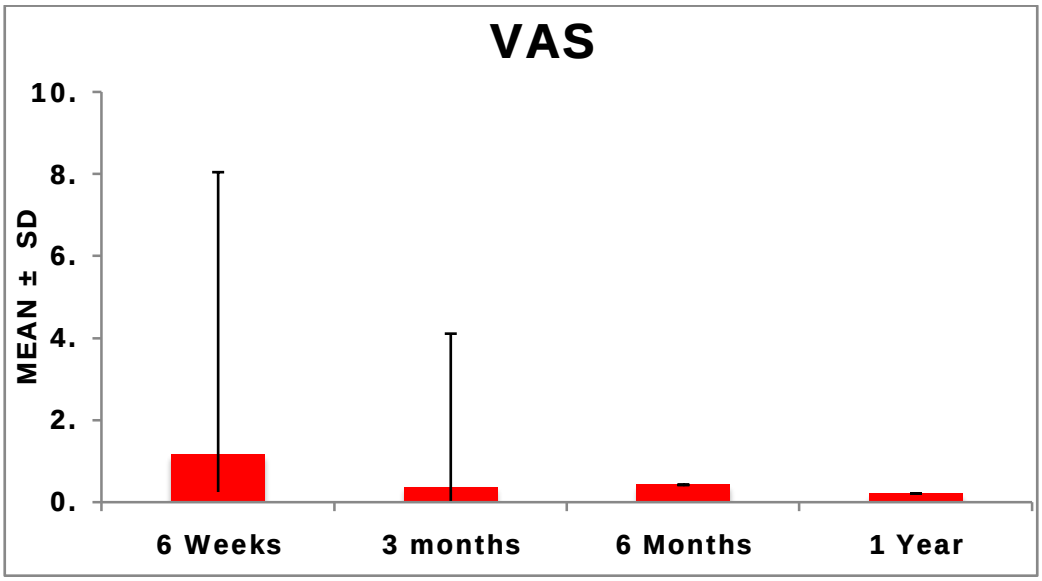

Figure 16

b) Complications

Malunion (Cubitus varus) was seen as the most frequent complication 15.8% of the study group. Infection (CDC Superficial) and Elbow stiffness were seen in 10.5% which was second most frequent complication noticed. Delayed union and implant failure was seen in 1 case (5.3%) each. One infected patient, after getting completely treated for infection, had implant pulled out at 6 months review also she had associated varus deformity , and elbow stiffness. The patient was not willing for deformity correction. She was managed with bursa excision, wound debridement and implant exit followed by antibiotics and regular dressing. One patient had delayed union and associated elbow stiffness; post 6 months fracture healed well. No intervention was done as the patient was unwilling. Only calcium, multi-vitamin supplementation, and supervised exercises were given. One patient with varus malunion had a postoperative superficial infection which was managed with regular dressing and antibiotics. Another varus malunion had no associated complication. Both malunion did not require any intervention as it did not deteriorate any function, and patients were satisfied without come.

Fractures: None of the patients had peri-prosthetic fracture during the follow-up.

Heterotrophic ossification: None of the patients had heterotrophic ossification during the follow-up. *Neurovascular Injury:* None of our patients had a neurovascular injury (Figure 17).

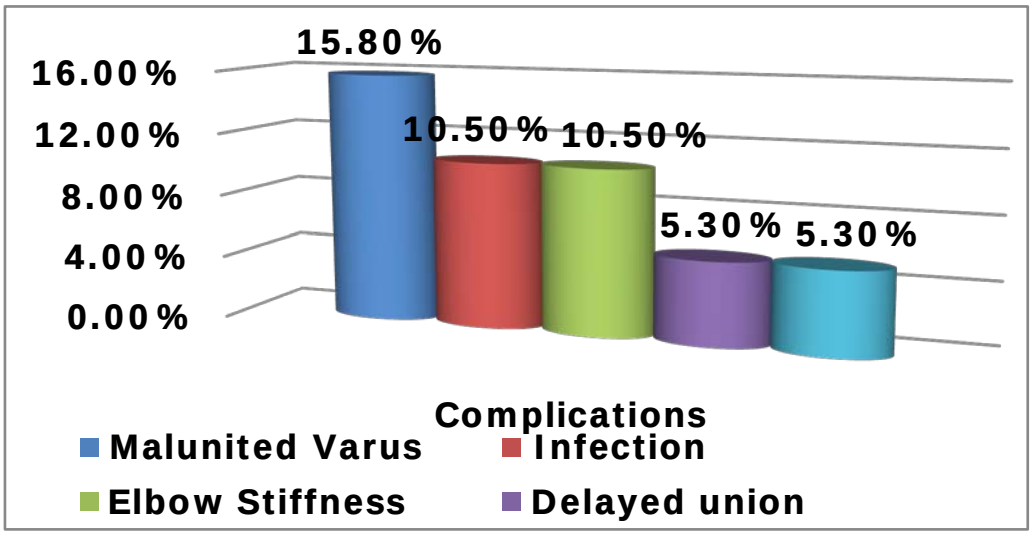

Figure 17

IV. Discussion

These fractures are closely associated with elbow function and its stability (7) (9), the elbow range of movement is essential for most daily activities indicating its earliest surgical fixation to restore the anatomical and functional integrity, and prevent both structural as well as neurovascular complications (3) (10) (11). But both intra-articular and extra-articular distal humerus fractures should not be put in the same mold of treatment. Damage caused by excessive soft tissue stripping should not be overlooked. John T Capo et al. (1) did a retrospective study where in his study at final follow-up; mean flexion was of 126±16 °, and extension was 7±7° at final follow-up. In Yatinder kharbanda et al. (12) study mean flexion was 125 °, and only one patient had flexion deformity of 5 ° at the end of one year after surgery. Rajendraprasad bhutala et al. (13) at 6 months of the study showed flexion of 128 °, and full extension in 17 cases and +10 in other 3 cases, and had concluded as excellent functional outcomes. In 2013 Gregory M. Meloy (14) did a multi-centered retrospective comparative study: A paradigm shift in the surgical reconstruction of extra-articular distal humeral fractures: single-column plating. Group 1 consisted of 53 extra-articular distal humeral fractures treated with dual column plating. Group 2 comprised 51 patients who were managed with a single pre-contoured poster lateral locking plate. In Group 1 (dual plating), the mean elbow flexion achieved was 127.09 ± 14.968 °, and the mean elbow extension was – 12.44 ± 10.848 °. In Group 2, the mean elbow flexion achieved was 136.1 ± 7.78 °, and the mean elbow extension was – 3.62 ± 4.968 °, they concluded Group 2 (single plating) had a better overall range of motion than Group 1. Group 2 in this study was compared to our study where mean flexion is 141.67 ± 4.201 °, and mean extension is 1.11 ± 3.234°. Our discussion with other studies comes to a conclusion that reduced soft tissue stripping, elimination of olecranon impingement or need of olecranon osteotomy has resulted in faster recovery, reduced rehabilitation time in flexion extension movement at elbow joint and thus the patients returned to their day to day activities earlier (Table 2).

Table 2

Elbow ROM		John T. Capo *et al* (post op)	Yatinder Kharbanda *et al*	Gregory M. Meloy (At 4 month)	Rajendraprasad bhutala *et al*	Our Study
6 week	Flexion (mean)					138.74 ± 8.685 °
	Extension (mean)					3.68 ±6.634 °
3 months	Flexion (mean)			136.1 ±7.78 °		141.67 ± 4.201°
	Extension (mean)			3.62±4.96 °		1.11 ± 3.234 °
6 months	Flexion (mean)				128 °	144.44 ± 1.617 °
	Extension (mean)				0 °; 3 cases ffd of 10 °	.00 °
1 year	Flexion (mean)	126±16°	125 °			145.00 ± .000 °
	Extension (mean)	-7 ± 7 °	0 °			.00 °

Similarly Supination/pronation was evaluated at 6 weeks and at later follow-up, and it was found that complete anatomical restoration of movement was achieved by 6 week itself, and no further benefit was possible at later follow-ups. Other researchers also had observed similar values in their observation. John T capo et al. (1) observed supination 83 ± 22 ° at 3 months where as it was 82 in Rajendraprasad Butala et al. (13) 6 months, and Yatinder kharbanda (12) got value of 84.5 ° at the end of 1 year which is within normal range of movement. In our study Supination was 83.42±1.539 ° at 6 week, 83.61±2.304 ° at 3 month, 84.00±1.455 ° at 6 month, and 84.00±1.455 ° at 1 year, and was statistically insignificant. I.e. Range of movement was recovered to full before 6 weeks, and no further improvement was possible beyond it. Pronation 82 ± 23 ° was reported by john T capo et al. (1) at 3 month where as it was 85 ° in Rajendraprasad Butala et al. (13) study, and Yatinder kharbanda (12) 83.75 ° at one year. In our study it was 78.16 ± 3.420 ° at 6 weeks, 78.68 ± 2.810 ° at 3 months, 78.06 ± 2.508 ° at 6 months, and 79.17± 3.536 ° at 1 year. Statistically, it was insignificant indicating it was functionally recovered before 6 weeks, and there was no further scope of improvement. Thus indicating supination and pronation movement were not affected primarily due to these fractures. Difficulty in supination pronation was due to surrounding soft tissue pain. Once the patient was pain free this movement had come back to normal (Table 3).

Table 3

Supination	John T. Capo *et al*	Yatinder Kharbanda *et al*	Rajendraprasad butala *et al*	Our Study
6 week	-			83.42 ± 1.539 °
3 months	83±22°			83.61 ± 2.304 °
6 months			82 °	84.00 ± 1.455 °
1 year		84.5 °		84.00 ± 1.455 °
Pronation	John T. Capo *et al*	Rajendraprasad butala *et al*	Yatinder Kharbanda *et al*	Our Study
6 week	-			78.16 ± 3.420 °
3 months	82±23°			78.68 ± 2.810 °
6 months		85 °		78.06 ± 2.508 °
1 year			83.75 °	79.17 ± 3.536 °

Hassan Fawi et al. (11) conducted a study on distal third humerus fractures treated using the Synthes 3.5-mmextra-articular distal humeral locking compression plate where the mean VAS score was 8.5. In the study conducted by John T Capo (1) there were 47% patients who had VAS score of 0 i.e. no pain,17% patients had score of 1-3 i.e. Mild pain,17% patients had score of 4-6 i.e. moderate pain, , and score of 7-10 in 0% patients i.e. severe pain. In our study VAS score was minimal by six weeks, and was further decreasing;

At 6 week mean VAS was 1.16±2.062, at 3 month. 37±1.012, 1 year. 21±.918, except at 6 months where it was increased (.42±1.017) due to implant failure that came up with aggrieved pain complaints. The score was compared from 6 weeks to 3 months (and later); At 6 weeks- 3 month it was statistically significant (p =0.05); marginally significant (p=0.58) at 6 weeks- 1 year due to a case of implant failure. Otherwise, in other patient's it was insignificant at 6 weeks- 6 month; 3 month -6 months, 1 year; at 6 months to 1 year. Indicating patients were relived of pain by 6 weeks, and there was no further scope of pain relief (Table 4).

Table 4

	Hassan Fawi *et al*	John T Capo *et al*	Our Study
VAS (mean)	8.5	0 None 47% 1-3 Mild 17% 4-6 Moderate 17% 7-10 severe 0%	6 week 1.16 ±2.062 3 month .37±1.012 6 month .42±1.017 1 year .21±.918

John T. Capo et al. (1) conducted a retrospective study consisting of 21 cases of distal humerus extra-articular fracture treated with single column lateral plate where DASH score was 25.8±17.7 at 3 months follow-up. In our study DASH at 6 weeks was 40.72 ±5.498, where as compared to john T Capo et al. (1) study at 3 month DASH score is 33.81 ± 5.522. Further it showed significant decrease in DASH score at every follow-up, indicating significant recovery over one year. Yatinder Kharbanda et al. (12) did a retrospective analysis of extra-articular distal humerus shaft fractures treated with the use of pre-contoured lateral column metaphyseal LCP by triceps-sparing poster lateral approach. At final follow-up the mean DASH score at 1 year was 17.6 ranging from 13.3 to 38.3 points. The normal DASH score in the general population has been reported to be around 10 with a standard deviation of 14.68. In our study, DASH score was decreasing over one year; at 6 weeks it was 40.72 ± 5.498 at 3 months 33.81 ± 5.522 at 6 months 30.51± 4.447, and at 1 year it was 15.82± 4.450. The score was compared 6 weeks to 3 months (and later); At 6 weeks- 3 month, 6 month, 1 year; at 3 month -6 month, 1 year; at 6 month to 1 year. All intervals were statistically significant (p <0.05) indicating improvement in patients daily activities throughout follow-up. That means the patients recovered to almost normal over 1 year (Table 5).

Table 5

DASH	John T. Capo *et al*	Yatinder Kharbanda *et al*	Our Study
6 week	-		40.72±5.498
3 months	25.8±17.7		33.81±5.522
6 months			30.51±4.447
1 year		17.6 (13.3-38.3)	15.82±4.450

Vivek Trikha et al. (15) Functional outcome of extra-articular distal humerus fracture fixation using a single locking plate elbow function was assessed by Mayo score at final follow-up, and was 90.8 -9.9 they concluded Stable reconstruction, and early initiation of physiotherapy are utilitarian to envision optimal outcome; the use of pre-contoured extra-articular distal humerus locking plates has yielded satisfactory results which were comparable to our study where mayo elbow score was 100. It was progressively increasing at follows up suggesting significant improvement at each follow-up. Similarly, in Deepak Jain et al. (16) prospective study of 26 patients The MEPS (average: 96.1; range 80–100) was excellent in 81% cases (n = 21), and good in 19% cases (n =5). There were 2 cases followed up to 1 year average MEPS was 90. Rajendraprasad Butala (17) mentioned MEPS score of 95.5 at 6 month, which is excellent outcomes, and is comparable to our study. In our study Mayo score was found to be increasing over a period of one year; at 6 weeks it was 88.74 ± 11.464, at 3 months 94.11 ± 7.752, at 6 month 96.39 ± 5.893, and at 1 year it was 100.00 ±.000. The score was compared 6 weeks to 3 months (and later); At 6 weeks- 3 month, 6 month, 3 month – 1 year; 6 month- 1 year; , and at 6 month to 1 year. All interval were statistically significant (p <0.05) except at 3 month - 6 month period where it was statistically insignificant. This was due to one patient who came back during this period with malunion, and implant failure. That means the patient's recovered to almost normal over 1 year. Single column plate has proved promising enough to provide equivalent fracture stabilization, eliminates olecranon impingement/ osteotomy, with less surgical exposure due to good implant strength, and designs , and is thereby helping the patients to quick return to their normal lifestyle (Table 6).

Table 6

Mayo	Vivek Trikha *et al*	Deepak jain *et al*	Rajendraprasad butala *et al*	Our Study
6 weeks	-			88.74 ± 11.464
3 months	-			94.11 ± 7.752
6 months	-	96.66	95.5	96.39 ± 5.893
1 year	90.8 ± 9.9	90		100.00 ± .000

Korner J et al. (9) conducted a retrospective study on distal humerus fractures in elderly patients: results after open reduction, and internal fixation consisting of 45 patients whose clinical, and radiological follow-up was obtained after a minimum of 24 months following surgery (median 87 months; range, 24-121 months). Functional results were evaluated according to the Mayo Elbow Score. Open reduction, and internal fixation of distal humerus fractures in elderly patients should be the main goal, since good elbow function can be achieved in the majority of patients. Elbow immobilization longer than 14 days should be avoided. Stable implant anchorage at the lateral column remains problematic, reflecting a general potential for further implant improvements.

V. Conclusion

Single- lateral column plating technique was a useful treatment option in the management of extra-articular distal humeral fracture. It addresses the difficulties encountered while managing these fractures, and provides predictable and satisfactory results. The plate matches the anatomic contour of the distal humerus, and does not impinge on the olecranon fossa, thus eliminates the need for olecranon osteotomy. It is low profile over the lateral column, and provides adequate stability leading to faster recovery. This technique can be safely performed using the Campbell's posterior triceps-splitting approach, which was associated with no iatrogenic radial or ulnar nerve palsies, and with less surgical exposure thus helping in quicker recovery, and reduced rehabilitation time. Early range of motion was probably the most important advantage of this technique. Full range of movements is observed by the first 6 weeks. But, patient's achieve a good functional score, recover to normal, and attain complete satisfaction over 1 year. The objective functional and radiological outcomes documented in our study were excellent, and impact of complications on the final functional outcomes was limited despite the minimal risk of postoperative varus deformity which primarily is a cosmetic deformity; as elbow had a full range of motion with no functional abnormality. Superficial infection was present in some patients, and we assume it was due to instant mobilization, and return into routine life, where wound care was neglected. Introduction of an early rehabilitation program along with the emphasis on the early use of the elbow and wound care, could improve the functional success of this technique.

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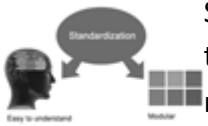

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We shall provide you intimation regarding launching of e-version of journal of your stream time to time.This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

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AUXILIARY MEMBERSHIPS

Institutional Fellow of Open Association of Research Society (USA) - OARS (USA)

Global Journals Incorporation (USA) is accredited by Open Association of Research Society, U.S.A (OARS) and in turn, affiliates research institutions as "Institutional Fellow of Open Association of Research Society" (IFOARS).

The "FARSC" is a dignified title which is accorded to a person's name viz. Dr. John E. Hall, Ph.D., FARSC or William Walldroff, M.S., FARSC.

The IFOARS institution is entitled to form a Board comprised of one Chairperson and three to five board members preferably from different streams. The Board will be recognized as "Institutional Board of Open Association of Research Society"-(IBOARS).

The Institute will be entitled to following benefits:

The IBOARS can initially review research papers of their institute and recommend them to publish with respective journal of Global Journals. It can also review the papers of other institutions after obtaining our consent. The second review will be done by peer reviewer of Global Journals Incorporation (USA) The Board is at liberty to appoint a peer reviewer with the approval of chairperson after consulting us.

The author fees of such paper may be waived off up to 40%.

The Global Journals Incorporation (USA) at its discretion can also refer double blind peer reviewed paper at their end to the board for the verification and to get recommendation for final stage of acceptance of publication.

The IBOARS can organize symposium/seminar/conference in their country on behalf of Global Journals Incorporation (USA)-OARS (USA). The terms and conditions can be discussed separately.

The Board can also play vital role by exploring and giving valuable suggestions regarding the Standards of "Open Association of Research Society, U.S.A (OARS)" so that proper amendment can take place for the benefit of entire research community. We shall provide details of particular standard only on receipt of request from the Board.

The board members can also join us as Individual Fellow with 40% discount on total fees applicable to Individual Fellow. They will be entitled to avail all the benefits as declared. Please visit Individual Fellow-sub menu of GlobalJournals.org to have more relevant details.

We shall provide you intimation regarding launching of e-version of journal of your stream time to time. This may be utilized in your library for the enrichment of knowledge of your students as well as it can also be helpful for the concerned faculty members.

After nomination of your institution as "Institutional Fellow" and constantly functioning successfully for one year, we can consider giving recognition to your institute to function as Regional/Zonal office on our behalf.
The board can also take up the additional allied activities for betterment after our consultation.

The following entitlements are applicable to individual Fellows:

Open Association of Research Society, U.S.A (OARS) By-laws states that an individual Fellow may use the designations as applicable, or the corresponding initials. The Credentials of individual Fellow and Associate designations signify that the individual has gained knowledge of the fundamental concepts. One is magnanimous and proficient in an expertise course covering the professional code of conduct, and follows recognized standards of practice.

Open Association of Research Society (US)/ Global Journals Incorporation (USA), as described in Corporate Statements, are educational, research publishing and professional membership organizations. Achieving our individual Fellow or Associate status is based mainly on meeting stated educational research requirements.

Disbursement of 40% Royalty earned through Global Journals : Researcher = 50%, Peer Reviewer = 37.50%, Institution = 12.50% E.g. Out of 40%, the 20% benefit should be passed on to researcher, 15 % benefit towards remuneration should be given to a reviewer and remaining 5% is to be retained by the institution.

We shall provide print version of 12 issues of any three journals [as per your requirement] out of our 38 journals worth $ 2376 USD.

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- The professional accredited with Fellow honor, is entitled to various benefits viz. name, fame, honor, regular flow of income, secured bright future, social status etc.

- In addition to above, if one is single author, then entitled to 40% discount on publishing research paper and can get 10%discount if one is co-author or main author among group of authors.
- The Fellow can organize symposium/seminar/conference on behalf of Global Journals Incorporation (USA) and he/she can also attend the same organized by other institutes on behalf of Global Journals.
- The Fellow can become member of Editorial Board Member after completing 3yrs.
- The Fellow can earn 60% of sales proceeds from the sale of reference/review books/literature/publishing of research paper.
- Fellow can also join as paid peer reviewer and earn 15% remuneration of author charges and can also get an opportunity to join as member of the Editorial Board of Global Journals Incorporation (USA)
- • This individual has learned the basic methods of applying those concepts and techniques to common challenging situations. This individual has further demonstrated an in–depth understanding of the application of suitable techniques to a particular area of research practice.

Note :

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- In future, if the board feels the necessity to change any board member, the same can be done with the consent of the chairperson along with anyone board member without our approval.
- In case, the chairperson needs to be replaced then consent of 2/3rd board members are required and they are also required to jointly pass the resolution copy of which should be sent to us. In such case, it will be compulsory to obtain our approval before replacement.
- In case of "Difference of Opinion [if any]" among the Board members, our decision will be final and binding to everyone.

"

Preferred Author Guidelines

We accept the manuscript submissions in any standard (generic) format.

We typeset manuscripts using advanced typesetting tools like Adobe In Design, CorelDraw, TeXnicCenter, and TeXStudio. We usually recommend authors submit their research using any standard format they are comfortable with, and let Global Journals do the rest.

Alternatively, you can download our basic template from https://globaljournals.org/Template

Authors should submit their complete paper/article, including text illustrations, graphics, conclusions, artwork, and tables. Authors who are not able to submit manuscript using the form above can email the manuscript department at submit@globaljournals.org or get in touch with chiefeditor@globaljournals.org if they wish to send the abstract before submission.

Before and during Submission

Authors must ensure the information provided during the submission of a paper is authentic. Please go through the following checklist before submitting:

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2. Authors must accept the privacy policy, terms, and conditions of Global Journals.
3. Ensure corresponding author's email address and postal address are accurate and reachable.
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- Findings
- Writings
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- Graphs
- Illustrations
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The corresponding author should mention the name and complete details of all co-authors during submission and in manuscript. We support addition, rearrangement, manipulation, and deletions in authors list till the early view publication of the journal. We expect that corresponding author will notify all co-authors of submission. We follow COPE guidelines for changes in authorship.

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Unless specified in the notification, the Editorial Board's decision on publication of the paper is final and cannot be appealed before making the major change in the manuscript.

Acknowledgments

Contributors to the research other than authors credited should be mentioned in Acknowledgments. The source of funding for the research can be included. Suppliers of resources may be mentioned along with their addresses.

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Authors can submit papers and articles in an acceptable file format: MS Word (doc, docx), LaTeX (.tex, .zip or .rar including all of your files), Adobe PDF (.pdf), rich text format (.rtf), simple text document (.txt), Open Document Text (.odt), and Apple Pages (.pages). Our professional layout editors will format the entire paper according to our official guidelines. This is one of the highlights of publishing with Global Journals—authors should not be concerned about the formatting of their paper. Global Journals accepts articles and manuscripts in every major language, be it Spanish, Chinese, Japanese, Portuguese, Russian, French, German, Dutch, Italian, Greek, or any other national language, but the title, subtitle, and abstract should be in English. This will facilitate indexing and the pre-peer review process.

The following is the official style and template developed for publication of a research paper. Authors are not required to follow this style during the submission of the paper. It is just for reference purposes.

Manuscript Style Instruction (Optional)

- Microsoft Word Document Setting Instructions.
- Font type of all text should be Swis721 Lt BT.
- Page size: 8.27" x 11'", left margin: 0.65, right margin: 0.65, bottom margin: 0.75.
- Paper title should be in one column of font size 24.
- Author name in font size of 11 in one column.
- Abstract: font size 9 with the word "Abstract" in bold italics.
- Main text: font size 10 with two justified columns.
- Two columns with equal column width of 3.38 and spacing of 0.2.
- First character must be three lines drop-capped.
- The paragraph before spacing of 1 pt and after of 0 pt.
- Line spacing of 1 pt.
- Large images must be in one column.
- The names of first main headings (Heading 1) must be in Roman font, capital letters, and font size of 10.
- The names of second main headings (Heading 2) must not include numbers and must be in italics with a font size of 10.

Structure and Format of Manuscript

The recommended size of an original research paper is under 15,000 words and review papers under 7,000 words. Research articles should be less than 10,000 words. Research papers are usually longer than review papers. Review papers are reports of significant research (typically less than 7,000 words, including tables, figures, and references)

A research paper must include:

a) A title which should be relevant to the theme of the paper.
b) A summary, known as an abstract (less than 150 words), containing the major results and conclusions.
c) Up to 10 keywords that precisely identify the paper's subject, purpose, and focus.
d) An introduction, giving fundamental background objectives.
e) Resources and techniques with sufficient complete experimental details (wherever possible by reference) to permit repetition, sources of information must be given, and numerical methods must be specified by reference.
f) Results which should be presented concisely by well-designed tables and figures.
g) Suitable statistical data should also be given.
h) All data must have been gathered with attention to numerical detail in the planning stage.

Design has been recognized to be essential to experiments for a considerable time, and the editor has decided that any paper that appears not to have adequate numerical treatments of the data will be returned unrefereed.

i) Discussion should cover implications and consequences and not just recapitulate the results; conclusions should also be summarized.
j) There should be brief acknowledgments.
k) There ought to be references in the conventional format. Global Journals recommends APA format.

Authors should carefully consider the preparation of papers to ensure that they communicate effectively. Papers are much more likely to be accepted if they are carefully designed and laid out, contain few or no errors, are summarizing, and follow instructions. They will also be published with much fewer delays than those that require much technical and editorial correction.

The Editorial Board reserves the right to make literary corrections and suggestions to improve brevity.

Format Structure

It is necessary that authors take care in submitting a manuscript that is written in simple language and adheres to published guidelines.

All manuscripts submitted to Global Journals should include:

Title

The title page must carry an informative title that reflects the content, a running title (less than 45 characters together with spaces), names of the authors and co-authors, and the place(s) where the work was carried out.

Author details

The full postal address of any related author(s) must be specified.

Abstract

The abstract is the foundation of the research paper. It should be clear and concise and must contain the objective of the paper and inferences drawn. It is advised to not include big mathematical equations or complicated jargon.

Many researchers searching for information online will use search engines such as Google, Yahoo or others. By optimizing your paper for search engines, you will amplify the chance of someone finding it. In turn, this will make it more likely to be viewed and cited in further works. Global Journals has compiled these guidelines to facilitate you to maximize the web-friendliness of the most public part of your paper.

Keywords

A major lynchpin of research work for the writing of research papers is the keyword search, which one will employ to find both library and internet resources. Up to eleven keywords or very brief phrases have to be given to help data retrieval, mining, and indexing.

One must be persistent and creative in using keywords. An effective keyword search requires a strategy: planning of a list of possible keywords and phrases to try.

Choice of the main keywords is the first tool of writing a research paper. Research paper writing is an art. Keyword search should be as strategic as possible.

One should start brainstorming lists of potential keywords before even beginning searching. Think about the most important concepts related to research work. Ask, “What words would a source have to include to be truly valuable in a research paper?” Then consider synonyms for the important words.

It may take the discovery of only one important paper to steer in the right keyword direction because, in most databases, the keywords under which a research paper is abstracted are listed with the paper.

Numerical Methods

Numerical methods used should be transparent and, where appropriate, supported by references.

Abbreviations

Authors must list all the abbreviations used in the paper at the end of the paper or in a separate table before using them.

Formulas and equations

Authors are advised to submit any mathematical equation using either MathJax, KaTeX, or LaTeX, or in a very high-quality image.

Tables, Figures, and Figure Legends

Tables: Tables should be cautiously designed, uncrowned, and include only essential data. Each must have an Arabic number, e.g., Table 4, a self-explanatory caption, and be on a separate sheet. Authors must submit tables in an editable format and not as images. References to these tables (if any) must be mentioned accurately.

Figures

Figures are supposed to be submitted as separate files. Always include a citation in the text for each figure using Arabic numbers, e.g., Fig. 4. Artwork must be submitted online in vector electronic form or by emailing it.

Preparation of Eletronic Figures for Publication

Although low-quality images are sufficient for review purposes, print publication requires high-quality images to prevent the final product being blurred or fuzzy. Submit (possibly by e-mail) EPS (line art) or TIFF (halftone/ photographs) files only. MS PowerPoint and Word Graphics are unsuitable for printed pictures. Avoid using pixel-oriented software. Scans (TIFF only) should have a resolution of at least 350 dpi (halftone) or 700 to 1100 dpi (line drawings). Please give the data for figures in black and white or submit a Color Work Agreement form. EPS files must be saved with fonts embedded (and with a TIFF preview, if possible).

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Tips for writing a good quality Medical Research Paper

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of medical research then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. Think technically: Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- Single section and succinct.
- An outline of the job done is always written in past tense.
- Concentrate on shortening results—limit background information to a verdict or two.
- Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- Give details of all of your remarks as much as possible, focusing on mechanisms.
- Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

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Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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ISSN 9755896