

# GLOBAL JOURNAL

OF MEDICAL RESEARCH: H

## Orthopedic and Musculoskeletal System

Clinical Outcome of Non

Tuberculosis of Zygapophyseal

### Highlights

Vsproximal Femoral Nails

Simultaneous Bilateral Trochanteric

Discovering Thoughts, Inventing Future

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ORTHOPEDIC AND MUSCULOSKELETAL SYSTEM

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## Tuberculosis of Zygapophyseal Joint: A Report of 3 Cases Observed in the University Hospital Center of Cocody in Abidjan (Côte d'Ivoire)

By Mohamed Diomandé, Ehaulier Soh Christian Louis Kouakou, Mariam Gbané-Koné, Baly Ouattara, Edmond Eti, Jean-Claude Daboiko & Marcel N'zué Kouakou

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**Abstract-** The zygapophyseal joint is very rarely affected with mycobacterium tuberculosis.

We report three new observations of tuberculosis of zygapophyseal joint. It usually affects immunocompromised patients particularly by HIV. The clinical symptoms are not very different from spinal tuberculosis. Plain radiographies of the lumbar spine are not contributory. The radiographic diagnosis was achieved through CT scan and/or magnetic resonance imaging. The diagnosis was made in the first case by polymerase chain reaction and in the second case by identification of mycobacterium tuberculosis. In the latter case, the diagnosis was presumptive with satisfactory outcome on tuberculosis treatment.

Zygapophyseal arthritis is an unusual location of the bone and joint tuberculosis. The performance of an efficient imaging (CT scan and/or magnetic resonance imaging) is necessary in front of any inflammatory low back pain.

**Keywords:** bone and joint tuberculosis - zygapophyseal arthritis – CT scan-magnetic resonance imaging - abidjan.

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# Tuberculosis of Zygapophyseal Joint: A Report of 3 Cases Observed in the University Hospital Center of Cocody in Abidjan (Côte d'Ivoire)

Mohamed Diomandé <sup>α</sup>, Ehaulier Soh Christian Louis Kouakou <sup>σ</sup>, Mariam Gbané-Koné <sup>ρ</sup>, Baly Ouattara <sup>ω</sup>, Edmond Eti <sup>¥</sup>, Jean-Claude Daboiko <sup>§</sup> & Marcel N'zué Kouakou <sup>x</sup>

**Abstract-** The zygapophyseal joint is very rarely affected with mycobacterium tuberculosis.

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**Keywords:** bone and joint tuberculosis - zygapophyseal arthritis - CT scan-magnetic resonance imaging - abidjan.

## I. INTRODUCTION

Bone and joint tuberculosis (BJT) accounts for 30% of extra-pulmonary localizations and is dominated by the spinal localization (50 to 60% of cases) producing generally spondylodiscitis<sup>1</sup>. The involvement of the posterior elements of the vertebrae (pedicles, transverse processes, posterior articular processes, spinous processes, blades) is rare, accounting for 3% of all spinal tuberculosis particularly the zygapophysial joint (ZJ)<sup>2</sup>. The involvement of this joint is rather unknown, contrary to the spondylodiscitis. We report 3 new cases of zygapophyseal tuberculous arthritis observed in the rheumatology department of the University Hospital Center of Cocody emphasizing the clinical and biological characteristics and the contribution of high-performance imaging.

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## II. CASES PRESENTATION

### a) Observation 1

A 46 year-old female patient, with no particular history, was admitted to our department for low back pain with sciatica poorly systematized after a misdiagnosis of 1 year. She was partially relieved by anti-inflammatory drugs. Two weeks before her hospitalization, her condition worsened by a walking disability. This clinical picture was developed into a context of vesperal fever, impairment of the general condition and night sweats. Clinical examination showed some painful points on palpation at the level of L4 and L5 vertebrae. There was no neuro-deficit sign. However tendon reflexes were brisk in the lower limbs. The tuberculin skin test (TST) was positive at 10 cm, the erythrocyte sedimentation rate (ESR) was 98 mm in the first hour, the C-reactive protein (CRP) was 285.5mg/l and the HIV serology was positive. Lumbar CT scan showed L4-L5 spondylodiscitis with soft tissue abscess and left zygapophyseal arthritis at the same stage (figure 1). The Polymerase Chain Reaction (PCR) performed on the abscess in search of mycobacterium tuberculosis was positive. The diagnosis of bifocal BJT was accepted. The patient was immobilized with a back brace. Antituberculous treatment combining Rifampicin-Isoniazid-Pyrazinamid-Ethambutol (RHZE) for 2 months following by 10 months of Rifampicin-Isoniazid (RH) allowed a favorable evolution marked by the healing of the patient.



Figure 1 : Lumbar CT scan showed L4-L5 spondylodiscitis and left zygapophyseal arthritis at the same stage CT (patient 1)

b) Observation 2

A 56-year-old female patient with a chronic renal failure was admitted for chronic bilateral low back pain with sciatica poorly systematized that developed gradually and became inflammatory about 45 days before hospitalization. She also had a productive cough with whitish sputum. To this symptomatology, was associated a state of agitation with incoherent remarks with no notion of headache. This clinical picture was developed into a context of vesperal fever and impaired general condition. On physical examination, we noted a fever of  $38^{\circ}1$  C, a lumbar spinal syndrome characterized by lumbar spinal stiffness much greater on extension, a positive bell test and a positive bilateral Lasègue's sign, at  $30^{\circ}$ . We did not observe any sign of neurological deficit. Pulmonary examination allowed to note the presence of crackles. The TST revealed anergia, ESR was 60 mm, CRP 24 mg/l and the HIV serology was positive. Acid-and alcohol fast bacilli were identified in the sputum. Cerebral CT scan was normal as well as the electroencephalogram. Analysis of cerebrospinal fluid showed cytology with 3 elements without any identified germ. Lumbar CT scan showed zygapophyseal arthritis from L4-L5 and L5-S1 without spondylodiscitis associated (figure 2). The diagnosis of pulmonary

tuberculosis and zygapophysial tuberculous arthritis was accepted. The healing was achieved after 12 months of antituberculous treatment (2 months of RHZE and 10 months of RH) associated with immobilization by a back brace.



Figure 2 : Lumbar CT scan showed bilateral zygapophyseal arthritis from L4-L5 and L5-S1 without spondylodiscitis (patient 2)

c) Observation 3

A 47- year-old female patient, with type 2 diabetes and with hypertrophic cardiomyopathy was hospitalized for low back pain and poorly systematized sciatica that developed chronically and became hyperalgesic about 1 month before hospitalization, causing difficulty in walking. She presented no visceral sign and this symptomatology was developed in a context of intermittent fever with a weight loss of 10 kg in 6 months. Clinical examination revealed a lumbar spinal syndrome with painful points at lumbar spine, a limitation of spinal movements with impossibility of extending the lumbar spine and a Schöber index at 10+2, a radicular syndrome with positive Lasègue's sign at 10°. The TST was negative as well as the HIV serology. ESR and CRP were respectively 90 mm and 41.64 mg/l. Lumbar CT scan revealed an intraductal hypodensity at the L3-L4 stage requiring the performance of a lumbar MRI which brought out a multi-stage zygapophyseal arthritis from L2 to S1 associated with epiduritis (figure 3). The evolution was favorable with immobilization with a back brace and after one year

of antituberculous treatment (2 months of RHZE and 10 months of RH).







Figure 3 : MRI of the lumbar spine showing in T2 sequence with fat suppression, a hyperintensity signal, next to zygapophyseal joints from L2 to S1 associated with taking contrast of zygapophyseal joint L3-L4, most seen in the left joint

### III. DISCUSSION

The ZJ is rarely affected by mycobacterium tuberculosis<sup>3,4</sup> judging by the very limited number of cases reported in the literature unlike Pott's disease. The prevalence of zygapophyseal tuberculous arthritis would be 1.76% according to the series of Narlawar et al<sup>2</sup>. Almost the majority of cases of zygapophyseal arthritis described was due to ordinary germs<sup>5,6</sup>. The involvement of the ZJ is best explained by the venous dissemination from anastomoses with the venous plexus on the surface of the posterior articular processes contrary to spondylodiscitis where the dissemination is achieved by arterial way<sup>7</sup>.

As in any tuberculosis, a predisposing factor is always present particularly HIV immunosuppression. In our case, patient 1 was HIV positive, patient 2 was HIV positive with chronic renal failure and patient 3 was diabetic. The diagnosis of zygapophyseal tuberculous arthritis is often delayed as it was the case in our 3 cases (6.5 months on average). This delay was due on the one hand by the fact that plain radiographies, always requested in first line cannot identify lesions of the ZJ because of the superposition of anatomical elements of the posterior arch and on the other hand the duration of misdiagnosis contributes to the installation of bone destructions as well as the increase in the risk of

neurological deficit<sup>4</sup>. The clinical symptoms were not significantly different than Pott's disease. We'll find spinal pains rather inflammatory with spinal stiffness much more pronounced on extension of the spine associated with painful point at the injury site. Neurological deficit complications are often associated<sup>4,8,9</sup> contrary to our 3 cases. A biological inflammatory syndrome is usually present as well as the positivity of TST. Acid-and alcohol-fast bacilli can be identified after sampling in case of soft tissue abscess where we can bring out a tuberculous follicle after biopsy of ZJ at the affected site. As regards imaging, plain radiography lacks sensitivity and cannot reveal diagnosis in most cases and imposes CT scan and /or MRI. CT scan is better to identify bone lesions particularly osteolysis or erosions of the edges of the joints like the case in 2 of our observations (patient 1 and 2). Even better than CT scan, MRI seems to be the test of choice to identify anomalies of the ZJ and the surrounding soft tissues (abscess, epiduritis) and makes early diagnosis<sup>2</sup>. Typically, it brings out bone inflammation as T1 hypointensity signal, T2 hyperintensity signal and T2-STIR hyperintensity signal (fat removal), or shows a hypointensity signal in T1-weighting of capsular ligamentous structures which enhance after gadolinium injection and T2 hyperintensity signal. It has great value in assessing neurological



damages<sup>2</sup>. In our cases, only patient 3 realized MRI after that CT scan could not identify the osteoarticular lesions. Definitive diagnosis was made in 2 out of 3 cases by bacteriology particularly by PCR (patient 1). PCR, recent technique with a specificity of 92-98%, rather unknown in sub-Saharan Africa, deserves to be promoted<sup>10</sup>. It allows rapid diagnosis and is a diagnostic alternative since biopsy of ZJ is difficult to perform, in our context because of the inadequacy of the technical platform. As for surgical biopsy, it is very expensive for the majority of our patients who do not have health insurance coverage. In the last case (patient 3), the epidemiological, clinical, biological and especially therapeutic and evolutionary arguments have prevailed in accordance with the work of Eti et al<sup>11</sup>.

Therapeutically, this antituberculous protocol that consisted of 2 months of RHZE followed by 10 months of RH, widely practiced in sub-Saharan Africa gave satisfactory results that ended in the recovery of patients after 12 months of treatment.

#### IV. CONCLUSION

Tuberculosis affects exceptionally ZJ. Clinically, it is not significantly different from Pott's disease. PCR is a recent technique which can help us to do definitive diagnosis, deserves to be promoted<sup>10</sup>. CT scan and / or MRI are imaging of choice.

*Conflict of Interest: None*

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## Cemented Bipolar Hemiarthroplasty Vs proximal Femoral Nails: A Prospective Comparative Outcome Analysis in Unstable Elderly Intertrochanteric Fractures

By Sunil K Dash, Prafulla K Sahoo, Ranajit Panigrahi, Dasarath Kissan,  
Dibya Singha Das & Manas Ranjan Biswal

**Abstract- Introduction:** Hip fractures always cause short-term pain, disability and a longer-term pain, disability or Deformity. Only a small number of reports on the incidence of hip fractures in the Asian population exist. Intertrochanteric fractures in osteoporotic bones with gross comminution are highly unstable and are associated with a high risk of morbidity and mortality.

**Material and Methods:** To compare the functional and clinical outcomes of cemented bipolar arthroplasty and proximal femoral nailing in unstable intertrochanteric fractures, this multicenter prospective study was initiated from Aug'12 to Dec'14 on 70 patients with unstable (Evans type III and IV) intertrochanteric fractures with minimum 2 years follow-up. Harris Hip Score was used to assess functional outcome.

**Keywords:** intertrochanteric, fracture, hemiarthroplasty, bipolar, PFN, elderly, osteoporosis.

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# Cemented Bipolar Hemiarthroplasty Vs proximal Femoral Nails: A Prospective Comparative Outcome Analysis in Unstable Elderly Intertrochanteric Fractures

## Hemiarthroplasty in Elderly Intertrochanteric Fractures

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**Abstract- Introduction:** Hip fractures always cause short-term pain, disability and a longer-term pain, disability or Deformity. Only a small number of reports on the incidence of hip fractures in the Asian population exist. Intertrochanteric fractures in osteoporotic bones with gross comminution are highly unstable and are associated with a high risk of morbidity and mortality.

**Material and Methods:** To compare the functional and clinical outcomes of cemented bipolar arthroplasty and proximal femoral nailing in unstable intertrochanteric fractures, this multicenter prospective study was initiated from Aug'12 to Dec'14 on 70 patients with unstable (Evans type III and IV) intertrochanteric fractures with minimum 2 years follow-up. Harris Hip Score was used to assess functional outcome.

**Results:** Out of 70 patients, independent full weight bearing and return to pre-fracture activity levels was early in arthroplasty group i.e. 1.2 ( $p < 0.001$ ) and 5.4 ( $p < 0.01$ ) weeks respectively as compared to PFN group i.e. 8.2 and 10.2 weeks respectively was significantly earlier in patients with bipolar arthroplasty group. Postoperative complications were lower in the arthroplasty group. Hip scores at 3 months in arthroplasty and PFN group was 80.55 and 68.89 ( $p < 0.001$ ); at 24 months, 86.46 and 75.91 ( $p < 0.01$ ) respectively.

**Conclusion:** Primary cemented hemiarthroplasty in unstable elderly hip fractures is reliable, technically simple and a safe procedure. It has a major advantage of allowing early mobilisation, immediate full weight bearing, rapid rehabilitation, shorter hospital stay and early return to work. Cemented arthroplasties are advantageous in non-union and high risk patients suffering from psychiatric illness in preventing peri-prosthetic dislocations and fractures.

**Keywords:** intertrochanteric, fracture, hemiarthroplasty, bipolar, PFN, elderly, osteoporosis.

### 1. INTRODUCTION

Elderly patients with hip fractures constitute the Largest Group of Emergency Orthopedics Admissions<sup>1</sup>. Hip fractures always cause short-term pain, disability and a longer-term pain, disability or Deformity<sup>2</sup>. The incidence hip fractures is approximately 80 per 100,000 persons and is expected to double over the next 50 years as the population ages<sup>3</sup> and intertrochanteric fractures makes up 45% of these fractures.

Intertrochanteric fractures are extra-capsular associated with severely displacement, rotations or comminution. Management of elderly hip fractures have evolved over the years ranging from old conservative treatment of traction, boot plaster or spica to more recent intramedullary fixations with titanium elastic nails, proximal femoral nails, dynamic hip screws or hemiarthroplasty and total hip replacement in gross comminution and loss of calcar femorale. The management is aimed to achieve a stable fixation and early full-weight-bearing mobilization<sup>4</sup> to prevent dreaded complications of dependency like pressure sores, pneumonia, muscle wasting, contractures and a lengthy hospital stay.

Unstable comminuted inter-trochanteric fractures are associated with poor bone quality, osteoporosis, pose difficulty in obtaining anatomical reduction and high non-union, metal failure and femoral head perforation rates<sup>5,6</sup>. Whereas simple Intertrochanteric fractures can easily be treated by

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osteosynthesis with proximal femoral nails and dynamic hip screws<sup>7-11</sup> with good results. Protocol for management of unstable elderly intertrochanteric fractures is lacking despite of the publication of reports of randomized trials and comparative studies<sup>8,9</sup>. To allow early weight-bearing, mobilisation, rehabilitation and early return to home, surgeons recommend prosthetic replacement in unstable intertrochanteric fractures<sup>12-14</sup> but established literature from the subcontinent on hemiarthroplasties for unstable intertrochanteric fractures is sparse.

Approximately 6.26 million hip fractures are predicted to occur worldwide in 2050, out of which 50% will occur in Asia<sup>15</sup>. Whereas only a small number of reports on the incidence of hip fractures in the Asian population exist<sup>15</sup>. We performed a prospective study to compare the functional and clinical outcomes of cemented bipolar arthroplasty as a primary treatment for unstable intertrochanteric fracture in the elderly patients and compared it to proximal femoral nail osteosynthesis.

## II. MATERIALS & METHODS

A multicenter Prospective therapeutic study was undertaken from August'2012 to December'2014 after approval from institutional ethical committee, 70 patients with unstable intertrochanteric fractures were included in the study group after obtaining consent to compare the outcomes of primary cemented hemi-arthroplasty versus intramedullary proximal femur nailing in treatment of elderly unstable hip fractures i.e. Evans type III or IV and AO/OTA type 31-A2.2 and 2.3)

### a) Inclusion criteria

Male/Female patients, Age > 60 years, fresh/old fractures, any etiology, unstable Intertrochanteric fracture of femur (Evans type III and type IV, AO/OTA type-(31-A 2.2 and 2.3)

### b) Exclusion Criteria

Patients who were unfit for surgery, refused for surgery, treated conservatively, stable intertrochanteric fracture i. e. Evans type I and type II, AO/OTA type – (A2.1 and A 1.1, 1.2, 1.3), compound fractures, pathological fractures, fracture neck of femur and sub trochanteric fractures were excluded from the study.

### c) Randomization Protocol

The study population (n=70) were divided into 2 groups (n=35) based on a computer based random number sequence by a person uninvolved in the surgical procedure. Group-1(n=35) was operated with hemi-arthroplasty and Group-2 (n=35) with Proximal femoral nailing. All surgical procedures were performed by the same surgical team which was blinded to the randomization procedure.

## III. METHODOLOGY

Patient's demographic data was recorded. Other pre-operative data included: fracture type, and comorbid medical problems. Postoperative data included duration of hospital stay, time to full weight bearing, postoperative complications such as pulmonary problems, urinary tract infection, deep vein thrombosis, cardiac problems, infection (superficial and deep), pressure sores, fixation failure, prosthetic dislocation, and mortality.

Patients were operated, as soon as their condition stabilized, usually within 48 hours following presentation. Same prophylactic antibiotics were the same in the two groups. IV cefuroxime given at the induction of anaesthesia and continued for 3 doses postoperatively. Prophylaxis against deep venous thrombosis using low molecular-weight heparin (enoxaparin) was started 12 hr prior to the operation and continued postoperatively.

All surgical procedures were performed under either spinal or epidural anesthesia.

### a) Operative technique

In the bipolar arthroplasty group (group 1): Pre-operative templating of radiographs was performed to determine the approximate size and position of the stem and femoral neck offset. Trans-gluteal lateral approach in a lateral decubitus position used. Femoral head and neck were osteotomized at a level determined by preoperative templating of the uninjured side and by the use of trial femoral components to help find the appropriate level. Meticulous care was taken to preserve the integrity of the greater trochanter, abductor muscles, and all the vascularised bone fragments. The femoral medullary canal was then reamed to appropriate stem size and diameter.

Trial reductions were performed to determine the exact length that will provide the desired tension and tissue balancing of the abductor muscles and equal leg length. Careful restoration of neck length, offset and version to maximize stability of the hip joint was also performed during trial. The definitive femoral stem was cemented by the use of a cement gun to deliver the cement in a doughy state. Small calcar bone fragments were reduced over the medial aspect of the femoral stem below the stem collar during insertion. Any protrusion of cement between reduced bone fragments was cleaned out. Hip reduction done and the gluteus medius muscle and vastus lateralis muscle were sutured to their anatomical locations using anchor sutures. Fascia Lata was tightly closed over a suction drain.

In the Proximal femoral nail group (group 2): Operations were performed on an orthopaedic fracture table, with the patients lying supine. Biplane fluoroscopy was routinely used. Close or if required open reduction was done to obtain an optimum position, with a correct

angle between the femoral neck and shaft or a slight valgus position. Distraction of the fragments, varus position, or lateral displacement of the shaft was avoided. The proximal part of the femur was exposed through a lateral approach with splitting of the vastus lateralis muscle, and PFN was inserted. The wound was closed in layers over a suction drain.

*b) Post-operative protocol*

Patients in the bipolar arthroplasty group were ambulated full weight bearing on the 2<sup>nd</sup> postoperative day with the aid of a physiotherapist. Patients in the internal fixation group were ambulated non-weight bearing on the 2<sup>nd</sup> postoperative day and gradually progressed to partial then full weight bearing depending on the quality of bone fixation assessed intraoperatively and bone healing on follow up radiographs.

Clinical radiological evaluation: After discharge from hospital, patients in both groups were followed at six weeks; at three, six, and twelve months; and yearly thereafter for radiological control and functional evaluation using the Harris Hip score at each visit. A stem was considered to be unstable when there was

progressive subsidence exceeding 3 mm, any change in position, or a continuous radiolucent line wider than 2 mm at the bone-cement interface.

*c) Statistical analysis*

Data were reported as mean, median (range) or number. T-test was used to assess significant difference among all numerical parameters of the study within the two surgical groups. P-values < 0.05 were considered statistically significant.

**IV. RESULTS**

Out of the 70 patients, 100% patients had unstable elderly intertrochanteric fracture of. In group-1, average age- 73.6 years (range: 60-91 years) with 16 men and 19 women. 15 patients had Evans III and 20 had Evans IV fracture type. In group-2, average age- 72.4 years (range: 60-89 years) with 17 men and 18 women. 16 patients had Evans III and 19 had Evans IV fracture type. Patient characteristics are represented in Table.1. The mean follow-up (months) in Group-1 and 2, was 22 (range 18-26) and 21 (range 19-24) respectively.

*Table 1 : Demographic and Preoperative Data (N=70)*

Variables	Group-1 (Hemiarthroplasty)	Group-2 (Proximal Femoral Nail)
No. of patients	35	35
Mean Age(range)	73.6 years (60-91 years)	72.4 years (60-89 years)
Sex(M/F)	16/19	17/18
Fracture type (no. of patients)		
Evans III	15	16
Evans IV	20	19

In Group-2, 8 patients had unsatisfactory results: 2 patients had limb shortening with range of motion limitation, 3 patients had screws back out, 2 patients were unable to walk due to generalized weakness and 1 patient had limping and pain. In Group-1, 4 patients had unsatisfactory results: 1 patient had restricted terminal movements, 2 patients had leg length discrepancy (more than 13mm), and 1 patient was unable to ambulate due to generalized weakness. There was no dislocation or femoral stem instability.

Postoperative complications were higher in Group-2; pressure sores (2 patients in group-1 and 7 in group-2), pulmonary complications (2 patients in group-1 and 6 in group-2), cardiac complications (1 patient in group-1 and 2 in group-2), superficial wound infection (3 patients in group-1 and 3 in group-2) which resolved completely after a course of antibiotics. No significant difference was noted between the 2 groups as regards the occurrence of urinary tract infection and deep vein thrombosis. For post-operative complications see Table-2.

*Table 2 : Postoperative complications in Group-1 and Group-2*

S.no	Complication	Hemiarthroplasty Group-1 (n=35)	PFN Group-2 (n=35)
1	Mortality rate (within 2 years)	2	1
2	Pulmonary Complications	2	6
3	Urinary Tract Infection	0	0
4	Deep Vein Thrombosis	0	0
5	Cardiovascular Complications	1	2
6	Prosthetic/Fixation related	3	6
7	Wound Infection	3	3
8	Pressure Sores	2	7



Mortality rate at 2 years was 2.8% and 5.6% in Group-1 and Group-2 respectively with no significant differences.

Harris Hip Score at 3<sup>rd</sup> month was significantly higher in patients who underwent bipolar arthroplasty (Group-1) 80.55 (range: 68–86) compared to those who

were operated with PFN(Group-2)68.89 (range: 58-75) ( $p<0.001$ ); at 12<sup>th</sup> month was 83.25 (range: 72–89) and 72.47 (range: 61-80) ( $p<0.01$ ) and at 24<sup>th</sup> month, it was 86.46 (range: 76–92) and 75.91 (range: 66- 84) ( $p<0.01$ ) respectively. Post-operative hip scores are represented in Table.3.

Table 3 : Functional outcomes in Group-1 and Group-2

	Hemiarthroplasty Group-1 (n=35)	PFN Group-2 (n=35)	p-value
Follow-up Period in months(range)	22 (18-26)	21 (19-24)	
Mean Time to full weight bearing (weeks)	1.2	8.2	$p<0.001$
Harris Hip Score (100)			
3 months	80.55( 68 – 86)	68.89 (58 - 75)	( $p<0.001$ )
12 months	83.25 (72 – 89)	72.47( 61 - 80)	( $p<0.01$ )
24months	86.46(76 – 92)	75.91 (66 - 84)	( $p<0.01$ )
Return to Normal daily activities (weeks)	5.4	10.2	$P<0.01$

Mobilisation was started in Group-1 on 2<sup>nd</sup> day postoperatively whereas in Group-2 mobilisation was started at mean- 4.2 days, the delay attributed to pain. Time to independent full weight bearing was mean- 1.2weeks in group-1and mean- 8.2 weeks in group 2 ( $p<0.001$ ) and return to the pre-fracture level of daily activity (5.4 weeks in group-1 compared to 10.2 weeks in group-2 ( $p<0.01$ ) was significantly earlier in patients who underwent bipolar arthroplasty.

## V. DISCUSSION

Displaced and Comminuted inter-trochanteric fractures in elderly osteoporotic patients pose challenging problems, with an added risk of increased morbidity and mortality. Treatment of these fractures aim at achieving a stable fixation and early mobilization with early return to daily activities<sup>16</sup>. Internal fixation has drastically reduced the mortality associated with intertrochanteric fractures; however; early weight bearing is still avoided in cases with comminution, osteoporosis, or poor screw fixation and non-weight bearing walking is recommended. Early post-operative ambulation is necessary to prevent complications like pressure sores, pneumonia, osteoporosis, contractures and muscle wasting.

Surgical treatment facilitates early rehabilitation with improved quality of life and function.

Patients who regain their independence have significantly lower mortality rates<sup>17</sup>. In this elderly cohort of patients with various co morbidities, it is difficult to maintain compliance with partial weight bearing. This obviously prolongs the duration of hospital stay in these patients and potentially predisposes them to further falls. In addition, they need regular outpatient follow-up

to assess fracture healing, osteonecrosis and implant position.

Although union rates as high as 100% have been reported in association with well-reduced, stable fractures that were treated with ideal implant placements, failure rates of as high as 56% have been noted in association with unstable fractures, comminutions, suboptimal fracture fixations, or poor bone qualities in elderly patients<sup>18,19</sup>. In patients with osteoporosis and unstable fracture patterns, dynamic hip screws and intramedullary devices are associated with higher rates of non-union, varus collapse, screw cut-out, rotational deformity and shortening<sup>20,21</sup>.

Post-operative infections, pain, hospital stay and independent full weight bearing were significantly lower in the Hemi-arthroplasty group ( $p<0.001$ ). Return to pre-fracture level of daily activity was achieved earlier in Hemi arthroplasty group i.e. 5.4 weeks as compared to 10.2 weeks in PFN group ( $p<0.01$ ), similar to other reported studies<sup>22</sup>. A concern with Joint replacements anywhere in the body is Peri-prosthetic Infections. Factors facilitate bacterial contamination around the prosthesis are septic operating conditions, diabetes, immunosuppressive and corticosteroid drug usage, long duration surgeries, large wound surfaces, extensive dissection<sup>23,24</sup> and revision surgeries. Proximal femoral nails were associated with more implant related complications attributed to a high learning curve and osteoporotic bone quality of the elderly population.

We had no instances of post-operative dislocations in patients treated with hemi-arthroplasty, attributed probably to large diameter of the head and self-centred cup that were used. Factors predisposing to dislocations following arthroplasty include abductor

weakness, trochanteric non-union<sup>26-28</sup>, faulty cementing technique and faulty acetabular cup placements in total hip replacements. The Harris hip scores, at 3 months were significantly higher for bipolar arthroplasty group i.e. 80.55 (range: 68–86) as compared to 68.89 (range: 58–75) in the PFN group ( $p < 0.001$ ); and at 24 months, 86.46 (range: 76–92) and 75.91 (range: 66–84) ( $p < 0.01$ ) respectively, similar to other published studies<sup>29,30</sup>.

Various implant related factors like bone collapse, fixation loss, and cut-out of the lag screw are high when fixing unstable elderly hip fractures with intramedullary implants like dynamic hip screws or proximal femoral nails resulting in poor function. Treatment of unstable intertrochanteric fracture is still controversial, despite of the publication of reports of randomized trials and comparative studies<sup>8,9</sup> and their role in unstable osteoporotic and severely comminuted intertrochanteric fractures is still to be defined.

We compared and found better clinico-functional outcomes with cemented bipolar arthroplasty with early return to home and work. Thus, we recommend cemented hemi-arthroplasty for primary treatment of unstable osteoporotic intertrochanteric fractures in elderly patients especially in whom recumbency and lengthy hospital stay is unfavorable. Cemented arthroplasties are advantageous in non-union and high risk patients suffering from psychiatric illness in preventing peri-prosthetic dislocations and fractures.

## VI. CONCLUSION

Primary cemented hemiarthroplasty in unstable elderly hip fractures is reliable, technically simple and a safe procedure. It has a major advantage of allowing early mobilisation, immediate full weight bearing, rapid rehabilitation, shorter hospital stay and early return to work. Cemented arthroplasties are advantageous in non-union and high risk patients suffering from psychiatric illness in preventing peri-prosthetic dislocations and fractures.

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## Clinical Outcome of Non Simultaneous Bilateral Trochanteric Fractures

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**Abstract-** The intertrochanteric fractures cause, over variable degrees, many problems of management problems of taking depending on the physiological condition of the patient as well as diseases that are associated. The literature is rich in studies on per trochanteric fractures. The results of treatment of intertrochanteric fractures were changed by the emergence of resistant osteosynthesis implants, avoiding certain mechanical failures, also by raising awareness of pre and post operative care and reducing very significantly the level of postoperative mortality at the origin of the bad reputation of these fractures in the elderly. The occurrence of contralateral trochanteric fracture is a rare and unusual event reported in the literature. A retrospective study is reported in 24 patients with a mean age of 68 years with bilateral trochanteric fracture. An analysis of the epidemiological distribution of morbidity and mortality has been made with a description of the postoperative evolution and functional outcome in these patients.

**Keywords:** *bilateral fracture, trochanteric fracture, elderly, functional outcome.*

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# Clinical Outcome of Non Simultaneous Bilateral Trochanteric Fractures

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**Abstract-** The intertrochanteric fractures cause, over variable degrees, many problems of management problems of taking depending on the physiological condition of the patient as well as diseases that are associated. The literature is rich in studies on per trochanteric fractures. The results of treatment of intertrochanteric fractures were changed by the emergence of resistant osteosynthesis implants, avoiding certain mechanical failures, also by raising awareness of pre and post operative care and reducing very significantly the level of postoperative mortality at the origin of the bad reputation of these fractures in the elderly. The occurrence of contralateral trochanteric fracture is a rare and unusual event reported in the literature. A retrospective study is reported in 24 patients with a mean age of 68 years with bilateral trochanteric fracture. An analysis of the epidemiological distribution of morbidity and mortality has been made with a description of the postoperative evolution and functional outcome in these patients.

**Keywords:** bilateral fracture, trochanteric fracture, elderly, functional outcome.

## I. INTRODUCTION

The trochanteric fractures are responsible for high morbidity and mortality especially in the elderly population over 65 years. With the increase in the average age in the world's population, the Orthopedic Surgeon is encountered more and more with bilateral trochanteric fractures. The objective of this paper is to study the epidemiological distribution of this type of fracture, time of the second fracture and to report the clinical and functional results of different therapeutic methods.

## II. MATERIAL AND METHOD

This is a retrospective study mono centric spread over three years, between January 2010 and December 2013, on 24 patients hospitalized in trauma and orthopedics surgery department B4. We have studied in such patients, with non-simultaneous bilateral trochanteric fracture, the age, the demographic distribution, the seat of the second fracture,, type of osteosynthesis, the time of occurrence, the use of an eventual anti osteoporotic treatment and the clinical and functional outcome. The average age of our patients was 68 years, the series contained 18 Women for 6 Men, and 10 patients of the series were operated in the

same department of surgery for the first fracture (figure 1 – 2 ). 90% of our patients were autonomous after the first surgery. One patient was hospitalized for severe decompensation of his diabetes (figure 3). Two men are operated in the same year for an adenocarcinoma non-metastatic prostate cancer (figure 4). The reception of all the patients was systematically at the service of surgical emergencies with complete radiographic assessment including a radiograph of the pelvis and knees. The pre-anesthetic assessment of these patients was an essential and important step for possible surgical management.

*Table 1 :* shows the distribution of associated diseases in our patients.

All patients underwent a transthoracic heart-echo-, chest radiography with an expert opinion of Cardiology. Therefore the average hospitalization days shall be extended with an average of 15 days. The average time of the surgical procedure was 6 days. The deadline for the second fracture was highly variable in the study population with a mean of 16 months. . One patient with an ischemic cerebrovascular accident during the first episode fell into the rehabilitation session in the second episode of fractures within a period 9 months (figure 5). According to Ender classification of intertrochanteric fractures, 90% of the series have an unstable fracture, with rupture of the internal walls and comminution of the greater trochanter. (Table 3)

## III. TECHNIQUES AND OSTEOSYNTHESIS EQUIPMENT

The number of ways of fixation of trochanteric fractures is particularly important. They followed the developments of the osteosynthesis, when there are only a few decades, the surgical treatment of these fractures is recognized as superior than the orthopedic treatment.

Advances in the quality of materials as well as the design of the implants have benefited, more than any other sector, of the osteosynthesis failure analysis.

In this series of patients, two determinants factors in the choice of type of internal implant, bone quality and the importance of fracture comminution. 85% of the patients have an osteoporosis which occurs in 90% of cases an unstable fracture, with a detachment of the lesser trochanter and varus displacement. To this situation the intramedullary fixation devices (third

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generation standard gamma nail) was preferred over the extramedullary devices (DHS Dynamic Hip Screw) figure.

The surgical act took place in all patients under spinal anesthesia, on an orthopedic table for a fracture reduction. Standard gamma nail were implemented in 20 cases by an extra trochanteric exposure and in 4 cases a DHS plate by subtrochanteric minimally surgical exposure was introduced.

#### IV. RESULTS

Analysis of the results of the series shows a rate of consolidation, any type of fracture confused, 95% of cases of patient operated. A single case of infection occurring on DHS plate in a diabetic patient managed by medical treatment with surgical debridement. A case of immediate post-operative deaths by cardiogenic shock in a patient with triple non-surgical coronary stenosis. A case of myocardial infarction with an ejection fraction of 50% at one year postoperatively. All patients were followed in consultation with rehabilitation sessions with hip walking without support from the first day after surgery. That is how the urinary and pulmonary infection rate is practically null. No cases of pressure ulcers or skin suffering support have been reported. One case of migration of cervical screw plate DHS 130 was operated by a Lame plate 95.

#### V. DISCUSSION

In the period between January 2010 and December 2013, per trochanteric fractures accounted for the majority of cases of fractures of the upper end of the femur with 220 files. Non-simultaneous bilateral fractures of these cases represent 9.1% which is comparable to the series published in the literature. [1]. According to recent studies the incidence increases with aging of the population relative to the increase of osteoporosis. With increasing age, the risk of repeated falls increases and consequently the risk of non-simultaneous fracture also increases.

##### a) Sex ratio

Our study confirms the predominance of hip fractures in women than in men, with less than one quarter of male patients in the whole series. This proportion is also explained by the predominance of women in this age relative to life expectancy [2] and [3].

##### b) Anatomical form of the contralateral fracture

According to Ender classification [5] The contralateral fracture was generally the same shape as the first anatomical fracture. Two-thirds of the series had the same fracture types.

Symmetry has been demonstrated in 64-83% of cases depending on the series [4], [8], [13] and [14]. Schroder et al. [13], in a series of fractures of the proximal femur, found 6.2% of contralateral fractures, with 68% of the same anatomical type. Boston [14] was

83% identical fractures with 25% of bilateral subtrochanteric fractures. One explanation is the generalized decrease in bone mass was more pronounced in patients with a fracture of the Trochanter [14].

In the study of Shabbat et al. [4] exist 92% of symmetry. This symmetry is explained by the fact that each patient has his own approach and its own architecture of the bone, which could result in the same type of fall and therefore the same anatomical type of fracture. Fukushima et al. [8] Schroder et al. [13], and Ferris et al. [19] propose endogenous and morphological criteria.

The main morphological criterion could be the size of the femoral neck: a short neck-less than 5 cm may increase the risk of a fracture of the greater trochanter, while the neck of more than 5 cm may preferentially lead to a fracture of the femoral neck.

##### c) Mortality and morbidity of bilateral Trochanter fractures

Trochanteric fractures have a bad reputation of increasing the mortality from 20% to 25% after the age of 70 years and accelerated loss of autonomy [1], [2], [3], [5] and [6]. The study of Tinetti et al. [] Shows a mortality rate of 2.5 years was 41%, with 48% of deaths in the first year. As well, 92% of patients had a satisfactory range before fracture compared with 61.5% being independent and autonomous 52.6% for walking to 2.5 years. The fall resulting in fracture was symptomatic of a pathological condition in 41% of cases. Zuckerman [9] evaluate the post operative autonomy after surgery for hip fracture, 20% stopped working, 30% of autonomy altered, and only 50% return to the previous level of autonomy.

The mortality rate in our series was 4.1% in patients with bilateral subtrochanteric fracture against a rate of 9.1% among patients registered in the same period with a unilateral subtrochanteric fracture. Boston [14] found a higher mortality in the second fracture (30% at 3 months 13% after a first fracture). For Berry et al. [7] the mortality increased by 16% at 1 year after a first fracture 24% for contralateral fracture. Haentjens et al. [22] found a higher mortality rate for trochanteric fractures (28% at 1 year), which occur in the elderly whose return to autonomy may be more difficult. Predictors of mortality in the short and medium term are advanced age more than 85 years, the minimum autonomy before the fracture and the time of surgical treatment [18]. Limited autonomy is a risk factor for recurrence and a negative factor for survival [7] and [21]. Patient management should be complete and consist of treating the episode of acute fracture and prevent the occurrence of complications related to factors and comorbidities, while preserving the autonomy of the patient. This management must be multidisciplinary and both medical and surgical with



surgeons, geriatricians, physiotherapists, dieticians and general physicians. [5]

d) *Can we prevent the second fracture?*

The risk factors for trochanteric fractures are multiple. A number of these factors can be prevented such as osteoporosis, iatrogenic factors, reduced physical activity and nutrition and neurosensory disorders. Others have no effective preventive measures (maternal history of hip fracture, the length of the femoral neck, hormonal history). [6] We must insist on the importance of preventing falls and especially repeated falls [5] and [21]. Merle [5] and Chiu et al. [30] found that 80% of patients who had a fracture of the hip fell in the following year. Neurological deficits are the main risk factors for falls in older people. Patients lateralization have higher rates of dementia, neurological disease, and Parkinson's disease [4], [8] and [30]. Malnutrition is also a risk factor [6] and [21]. Osteoporosis, the main risk factor for hip fracture, is under-diagnosed and under-treated [4], [6], [12] and [16]. However, a 5% increase in bone mineral density (BMD) appears to reduce the risk of fracture of the proximal femur by 25% [6] and [23].

It has been demonstrated that medical treatment with bisphosphonates, estrogens, vitamin D and calcium, and recently strontium ranelate [24], to reduce the rate of hip fracture in elderly women [26] and [27]. Bisphosphonates increase BMD, especially during the first 3 years of treatment, and reduce the risk of non-vertebral fractures [16] and [23]. The indication is suggested after a vertebral fracture, wrist or hip fracture because these are signs of osteoporosis [5]. The study of files the series shows that only 2 patients received treatment with vitamin D with calcium. Haentjens et al. [22] described the Trochanter fracture often associated with vitamin D deficiency. Taking vitamin D in combination with calcium reduces the incidence of hip

fracture in particular during the first 18 months [5], [16] and [28]. This treatment preserves bone quality and reduces the risk of falls by improving muscle function [12] and [15]. Shabbat et al. [4] confirmed that the preventive medical treatment is generally well accepted, while only 24% of patients receive after a first fracture. Kamel et al. [29] have shown that only 5% of women are effectively treated after a first hip fracture.

Chapurlat and Meunier [16] confirmed the obligation of orthopedic surgeons to refer the patient to a medical treatment of osteoporosis when they show a typical fracture (fracture of the lower end of the wrist, vertebral fracture or hip fracture). This management includes the specific treatment of osteoporosis as well as calcium and vitamin D.

After an initial Trochanter fracture, effective rehabilitation should be established with a capital for as short as possible and exercises to increase walking and promote rapid recovery of autonomy period. It is essential to adapt the patient's environment or even equip the patient to prevent future falls, as well as to provide appropriate medical care to its comorbidities.

VI. CONCLUSION

Trochanteric fractures are a public health problem for the elderly. The incidence of bilateral Trochanter fractures increases with the aging of the population. The incidence is continuing growth in the order of 10%, with 85% identical to the first fracture. They occur on average within two years after the first fracture. Prevention is necessary and essential, requiring a triple action: on the patient's environment, rehabilitation to establish autonomy after a first fracture, and preventive treatment of osteoporosis.

*Conflict of interest*

The authors declare no conflict of interest.

Table 1 : Distribution of associated defects in the study population

	Type II diabetes	Adenocarcinoma of the prostate	Vascular ischemic stroke	ischemic heart disease	Parkinson's disease	depression	dementia	kidney failure	Cirrhosis of viral hepatitis C
Number of cases	4	2	1	1	1	3	1	2	1



Figure 1 : Bilateral fracture of the trochanter (DHS plate)



Figure 2 : Bilateral fracture of the trochanter (decline of neck screw)



Figure 3 : DHS plate for treatment of trochanteric fracture right not Displaced



Figure 4 : Undisplaced contralateral fracture

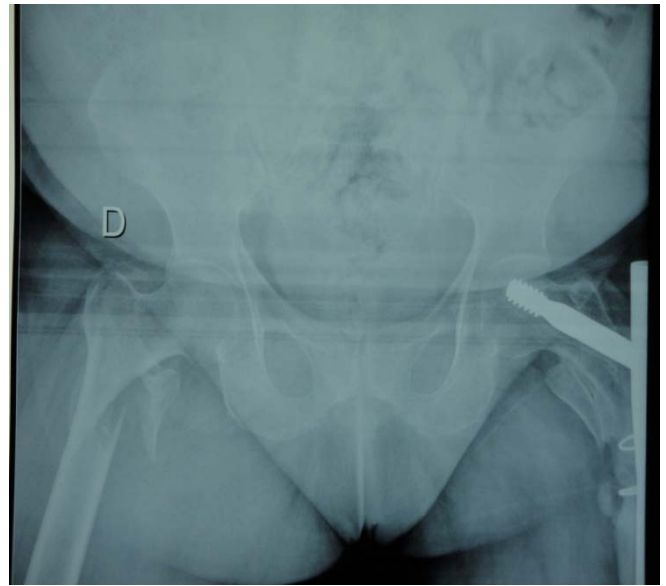


Figure 5 : The right trochanter contralateral comminutive fracture



Figure 6 : Consolidation of both fracture sites

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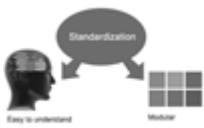






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#### References

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





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**28. Make colleagues:** Always try to make colleagues. No matter how sharper or intelligent you are, if you make colleagues you can have several ideas, which will be helpful for your research.

**29. Think technically:** Always think technically. If anything happens, then search its reasons, its benefits, and demerits.

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**33. Report concluded results:** Use concluded results. From raw data, filter the results and then conclude your studies based on measurements and observations taken. Significant figures and appropriate number of decimal places should be used. Parenthetical remarks are prohibitive. Proofread carefully at final stage. In the end give outline to your arguments. Spot out perspectives of further study of this subject. Justify your conclusion by at the bottom of them with sufficient justifications and examples.

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- Please note the criterion for grading the final paper by peer-reviewers.

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The introduction will be compiled from reference matter and will reflect the design processes or outline of basis that direct you to make study. As you will carry out the process of study, the method and process section will be constructed as like that. The result segment will show related statistics in nearly sequential order and will direct the reviewers next to the similar intellectual paths throughout the data that you took to carry out your study. The discussion section will provide understanding of the data and projections as to the implication of the results. The use of good quality references all through the paper will give the effort trustworthiness by representing an alertness of prior workings.



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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 approach to the problem, relevant results, and significant conclusions or new questions.

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- Fundamental goal
- To the point depiction of the research
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- Significant conclusions or questions that track from the research(es)

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## Approach:

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- Sort out your thoughts; manufacture one key point with every section. If you make the four points listed above, you will need a least of four paragraphs.



- Present surroundings information only as desirable in order hold up a situation. The reviewer does not desire to read the whole thing you know about a topic.
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This part is supposed to be the easiest to carve if you have good skills. A sound written Procedures segment allows a capable scientist to replacement 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 for the least amount of information that would permit another capable scientist to spare 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 object, mention the specific item describing a way but draw the basic principle while stating the situation. The purpose is to text 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.

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- Do not take in frequently found.
- If use of a definite type of tools.
- Materials may be reported in a part section or else they may be recognized along with your measures.

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- Describe the method entirely
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- Simplify - details how procedures were completed not how they were exclusively performed on a particular day.
- If well known procedures were used, account the procedure by name, possibly with reference, and that's all.

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- Skip all descriptive information and surroundings - save it for the argument.
- Leave out information that is immaterial to a third party.

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The principle of a results segment is to present and demonstrate your conclusion. Create this part a 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. Carry on to be to the point, by means of statistics and tables, if suitable, to present consequences most efficiently. You must obviously differentiate material that would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matter should not be submitted at all except requested by the instructor.



## Content

- Sum up your conclusion in text and demonstrate them, if suitable, with figures and tables.
- In manuscript, explain each of your consequences, point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation an exacting study.
- Explain results of control experiments and comprise 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 in manuscript form.

### What to stay away from

- Do not discuss or infer your outcome, report surroundings information, or try to explain anything.
- Not at all, take in raw data or intermediate calculations in a research manuscript.
- Do not present the similar data more than once.
- Manuscript should complement any figures or tables, not duplicate the identical information.
- Never confuse figures with tables - there is a difference.

### Approach

- As forever, use past tense when you submit to 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 part.

### Figures and tables

- If you put figures and tables at the end of the details, make certain that they are visibly distinguished from any attach appendix materials, such as raw facts
- Despite of position, each figure must be numbered one after the other and complete with subtitle
- In spite of position, each table must be titled, numbered one after the other and complete with heading
- All figure and table must be adequately complete that it could situate on its own, divide from text

### Discussion:

The Discussion is expected the trickiest segment to write and describe. A lot of papers submitted for journal are discarded based on problems with the Discussion. There is no head of state for how long a 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 implication of the study. The purpose here is to offer an understanding of your results and hold up for all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of result should be visibly 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 with prospect, and let it drop at that.

- Make a decision if each premise is supported, 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 the experiment might be personalized to accomplish a new idea.
- Give details all of your remarks as much as possible, focus on mechanisms.
- Make a decision if the tentative design sufficiently addressed the theory, and whether or not it was correctly restricted.
- Try to present substitute explanations if sensible alternatives be present.
- One 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 available information
- Submit to work done by specific persons (including you) in past tense.
- Submit to generally acknowledged facts and main beliefs in present tense.



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<i>References</i>	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring



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