

PROSPECTIVE STUDY ON SURGICAL MANAGEMENT OF PERIPROSTHETIC FEMUR FRACTURES FOLLOWING HEMIARTHROPLASTY OF HIP

Orthopaedics

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ABSTRACT

Introduction: Management of periprosthetic fractures are a challenge for surgeons and patient attenders do have some kind of dilemma because of its associated comorbidities, subsequently taking high risk even on table death risk and complications in perioperative period are always stressful and emotional too. This study explains about periprosthetic fractures, their diagnosis, classification, appropriate management, intraop difficulties along with post op complications and long term results. **Materials And Methods;** data collected from medical records at prathima hospital nagunoor, karimnagar. Study extends over a period of 2yrs from dec2022 - dec2024. Vancouver classification was used for our study. **Results:** Most common in females, most common age group is between 7th- 8th decade. Distal femur long lcp plate was most commonly used implant, complications are variable in each case. **Conclusion:** 1) preoperative diagnosis & proper planning of surgery is very essential in treating periprosthetic fractures. 2) intraop GT, LT & shattering of cortex of shaft are common so we should be ready with set of implants for those also. 3) cementless stems are outdated now because of increased risk of periprosthetic fractures in future. custom made implants are better choice in treating periprosthetic fractures rather than routine implants available in market.

KEYWORDS

Periprosthetic fracture, Vancouver, Lcp plate, Hemiarthroplasty, Amp, Bipolar prosthesis.

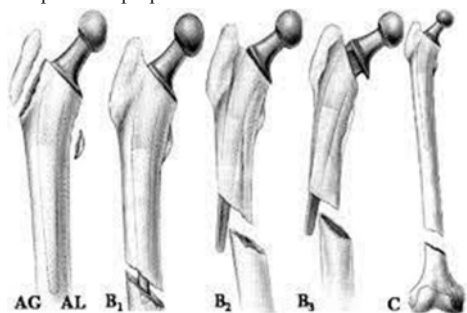
INTRODUCTION:

Fracture neck femur is common in elderly population². Hemiarthroplasty was done with amp or bipolar prosthesis in first attempt. As life expectancy is increasing nowadays we are encountering more number of periprosthetic fractures. Management of these fractures are challenging for surgeons and dilemma for patient attenders because of associated comorbidities and taking high risk even on table death risk and complications in perioperative period are always stressful and emotional too.

Many patients themselves decide as conservative treatment is better option because of comorbs which are not at all possible for union of these periprosthetic fractures at that age. Many times we go for palliative care only when patient is not fit for surgery. With this background we want to study the periprosthetic fractures, their diagnosis, classification, appropriate management, intraop difficulties and post op complications and long term results.

MATERIALS AND METHODS:

Data collected from admitted patient records at prathima hospital nagunoor, karimnagar. Study period was 2yrs from dec2022 to dec2024. Vancouver classification was used for our study. Full length x-rays of thigh including hip and knee ap and lateral views. X-ray pelvis with both hips also done to know opposite status. Every case evaluated by cardiac, pulmo, medical fitness preoperatively. Follow up is done at 6wks interval until fracture union and there after every yr. At each followup x-rays were done and range of motion was assessed and any complications noted. MIPPO was done in possible cases, rest all cases extensile lateral approach was used and previous hemiarthroplasty scar was included at upper end. All cases were done in supine position with spinal and epidural top-ups.



Vancouver Classification

Location	Lesser trochanter	Greater trochanter	Around the stem			Distal to stem
Stem fixation	Well-fixed	Well-fixed	Well-fixed	Loose	Loose	Ignore implant and revise if necessary after the fracture has healed
Bone stock	Good	Good	Good	Good	Poor	
Classification	A-L	A-G	B1	B2	B3	C
Treatment options	Symptomatic treatment unless substantial medial cortex is involved	Symptomatic treatment; intervene only to treat pain, weakness, limp or instability	Cerclage, cortical struts and plate	Revision to a long stem	Revision and augmentation with an allograft or tumor prosthesis	Fix the fracture first

Vancouver Classification

Inclusion Criteria:

- 1) all cases of post amp and bipolar hemiarthroplasty.
- 2) cemented and uncemented hemiarthroplasty cases.
- 3) vancouver type b1 and type c type fractures.

Exclusion Criteria:

- 1) vancouver type A, B2, B3.
- 2) intraop fractures.
- 3) revision amp and bipolar surgeries because of loose stems or poor bone stock.
- 3) post THR and post TKR periprosthetic fractures.
- 4) retrograde nailings.

RESULTS:

Age Distribution: most common age group in our study 70 to 80yrs.

Sex Distribution: 80 % females, 20% males. Previous type of implant: 5 were amps and 5 were bipolars. out of 5 amps only 1 was cemented and out of 5 bipolars 3 were cemented type. No thompsons implants were encountered in our study.

- Time since hemiarthroplasty to periprosthetic fracture: maximum 10 yrs and minimum 3months. average 6.3 yrs.

Mechanism of injury: all cases were accidental self fall which occurred at home. no major road traffic accidents or fall from heights.

Vancouver classification type:

7 are type b1, only 3 are type c.

- Time for fixation of periprosthetic fractures: Max 6hrs.min

2hrs,average 3.45hrs.

Type of implant used for fixation of periprosthetic fractures;in 8 cases distal femur long lcp plates was used.1 case pficp was used.1 case lcp shaft femur plate used.cerclage wires used additional to plates in 3 cases.

name	age	sex	implant	time gap	vancomycin type of #	op time	implant used now	complications	co morbis	date of surgery
1. Israni	80	F	AMP	10 yrs	trivers femur (b1)	3hr	long lcp distal femur	prominent implant tip and beads at 8 months followup	implant removal done at 2yrs	26/6/2022
2. Begum	65	F	amp	3yrs	trivers femur (b1)	2hrs	long lcp distal femur	delayed union bedsores at 2 months followup	hxn and dnc2	7/8/2021
3. mullamra	53	F	amp	10 yrs	trivers femur (b3)	2.5hr	long lcp distal femur	foot drop at 2 months follow up	hxn and chronic anemia	3/3/2024
4. lacharia	70	F	cemented bipolar	3yrs	trivers femur (b1)	4hrs	long lcp distal femur	wound gaping and infection applied beads at 2 months	bronchial asthma	8/8/2023
5. sarabane	66	F	amp	3m	long spiral #b3	4hrs	long lcp distal femur	intraop femoral artery branch perforation	cva brain recovered	5/10/2024
6. duramma	78	F	un cemented bipolar	5yrs	trivers shaft (b3)	3hrs	long lcp distal femur	superficial wound infection	post CABG	8/8/2023
7. komuriah	78	m	cemented of AMP	8yrs	tramp shaft (c)	3hrs	long lcp distal femur and cerclages			11/9/2024
8. sanukamma	73	F	un cemented bipolar	9yrs	tramp shaft (c)	3hrs	long lcp distal femur	unable to achieve reduction intra op done shortening		12/9/2024
9. suravva	78	F	cemented bipolar	10 yrs	trivers shaft (b3)	3 hrs	long lcp distal femur and cerclages	unable to span entire length of femur (implant shortage)	chronic psychiatric illness	10/10/2024
10. gangadai	55	m	cemented bipolar	5yrs	tramp shaft (c)	4hrs	long lcp shaft	unable to span entire femur length non union and distal femur nail 9 months	hxn and dnc2	11/4/2024

Complications: in order of cases mentioned in table

- 1) prominent implant tip and pseudo bursitis at tip.
- 2) bedsores at 1 month postop and delayed union.
- 3) post op footdrop at 2 months followup.
- 4) superficial wound gaping and infection, applied cement beads at 2 months followup.
- 5) intraop arterial perforator profuse bleed while dissecting posteromedially in shaft femur.
- 6) superficial wound infection at 10th post op day subsided by antibiotics.
- 7) nil
- 8) unable to achieve reduction of fragments, intraop shortening of 1cm was done using bone nibbler and fixed.
- 9) unable to span entire femur length because of shorter length of plate available in the market.
- 10) non union shaft femur and had supracondylar femure fracture at 9 months follow up because of short length plate.

- **Time To Union Of Fracture:** Average 9months to complete union process.

No retrograde nails were used in our study. No primary bone grafting were used in fixation. No intraop or post op deaths occurred. Most cases 2-3 units of blood transfusion were carried out. In every case parathyroid hormone injections were used for 6 months to augment healing of fractures.



Type B1 Vancouver Transverse Fracture



Type B1 Vancouver With Long Spiral Fracture

DISCUSSION:

Periprosthetic fractures are more common in females than males in our study, reason may be because of postmenopausal osteoporosis³. most common age group is 70 to 80yrs, reason might be added comorbs like CVA, diabetes, hypertension, CAD, CKD at that age group.

- Uncemented prosthesis are more than cemented one because patient is young and with good bone stock at the time of hip hemiarthroplasty most of the surgeons prefer uncemented stems.
- Amp and bipolars are equal no of cases in our study, nowadays bipolars are most preferred than AMPs because of higher range of motion and lower acetabular wear and tear that in turn reducing the need of THR in coming future.
- Avg time gap between 1st and 2nd surgery is 6yrs, by this time there varus collapse of implant and excess bowing of shaft femur as the age progress resulting in lateral cortex touching the implant tip and causing periprosthetic fracture with preexisting thigh pain¹⁸.
- In our study 80% are vancouver b type, reason may be its most stressful area and forces transmitting from implant tip on to the bone directly. we excluded b2 and b3 type because they require revision of hemiarthroplasty prosthesis and again fixing the periprosthetic fractures which might hinder the functional outcome of patient.^{19 20}
- Long distal femur precontoured lcp plate was used almost 80% cases because we need relative stability and rigid construct in union of these fractures. no dcp type implant used because they further hamper the blood supply of fracture fragment area. lcp can be inserted by mippo technique so its always a better implant to consider. ss wires used as cerclage wiring whenever there is no screw purchase possible in bone.
- Post op almost every case was used PTH injections for 6 months as a prophylactic measure to ensure early bone union. weight bearing is allowed after 6wks because unicortical purchase of screws are not that strong as bicortical and we are in fear of failure of fixation if done early. quadriceps and rom exercises done from immediate post op day, which is the reason for achieving near normal rom in most of the cases.
- Average operating time in our study was 3.45 hrs, it depends on the skill of the surgeon and proper execution of plan preoperatively to encounter the upcoming difficulties. average time to achieve bone union between 9m to 1 yr which is comparable to other published studies. average blood loss in each case is 500ml, reason might be patients on anticoagulants and lengthy incisions we always need for these cases. this also the reason for opting the blood transfusion postoperatively.

Demerits Of Our Study;

- 1) short sample size.
- 2) short duration of followup.
- 3) all cases are low socioeconomic background so we did not use cables and cable with screw type locking system because of cost constraints which might give better results than what we have achieved now.

CONCLUSION:

- 1) preoperative diagnosis and proper planning of surgery is very essential in treating periprosthetic fractures.
- 2) intraop GT, LT and shattering of cortex of shaft are common so we should be ready with set of implants for those also.
- 3) cementless stems are outdated now because of increased risk of periprosthetic fractures in future.
- 4) custom made implants are better choice in treating periprosthetic fractures rather than routine implants available in the market.
- 5) bicortical purchase of screws in stem portion of prosthesis and spanning entire length of femur are keypoints for success of the surgery.
- 6) multidisciplinary support like cardiology, nephrology, endocrinology, pulmonology, critical care, anaesthetist are essential for dealing these geriatric periprosthetic fractures to have successful outcomes.

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