



SUBTROCHANTERIC FEMUR FRACTURE IN A PATIENT WITH PAGET'S DISEASE OF BONE MANAGED BY PROXIMAL FEMORAL NAILING A2 (PFNA2): A CASE REPORT

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ABSTRACT

Background: Paget's disease of bone is a chronic skeletal disorder characterised by excessive osteoclastic resorption and disorganised osteoblastic activity, resulting in weak, enlarged and vascular bone. Fractures through pagetic bone are technically demanding because of deformity, sclerosis and distorted medullary anatomy. **Case Presentation:** A 68-year-old man with known Paget's disease of the left femur presented with pain and inability to bear weight after a low-energy fall. Radiographs showed a Seinsheimer type IIA subtrochanteric fracture through sclerotic, expanded pagetic bone, and serum alkaline phosphatase was markedly elevated. After pre-operative optimisation with bisphosphonate therapy and calcium-vitamin D supplementation, fixation was performed with a Proximal Femoral Nail Antirotation-A2 (PFNA2) under image intensifier guidance. Distorted canal anatomy, increased bleeding tendency and cortical thickening made reduction difficult, but careful reaming and nail insertion were achieved with minimal complications. **Outcome:** Partial weight bearing began on postoperative day 5. At 6 months, radiographs showed satisfactory union without implant-related complications, the Harris Hip Score was 84 (good), and serum alkaline phosphatase was trending downward. **Conclusion:** PFNA2 fixation, combined with appropriate medical control of Paget's disease, is a stable and effective option for subtrochanteric fractures in pagetic bone, allowing early mobilisation and good functional recovery.

KEYWORDS : Paget's Disease of Bone; Subtrochanteric Fracture; Proximal Femoral Nail; PFNA2; Bisphosphonate; Seinsheimer Classification

INTRODUCTION

Paget's disease of bone is a chronic skeletal disorder marked by excessive osteoclastic resorption followed by disorganised osteoblastic bone formation, producing weak, enlarged and vascular bone. It most commonly involves the pelvis, spine, skull and long bones, and predominantly affects men over 50 years of age [1,2]. Many patients are asymptomatic, whereas others present with bone pain, deformity or fracture.

Diagnosis rests on an elevated serum alkaline phosphatase with normal calcium and phosphate levels, supported by radiographic findings of cortical thickening and sclerosis. Genetic and viral factors have been implicated, with IL-6-mediated osteoclast activation contributing to pathogenesis. Bisphosphonates with calcium and vitamin D supplementation remain the mainstay of medical treatment [1,3].

Fractures through pagetic bone pose particular surgical difficulty. We report a subtrochanteric femur fracture in a patient with Paget's disease treated with PFNA2, highlighting the perioperative considerations and the outcome at 6 months.

Case Presentation

A 68-year-old man with known Paget's disease of the left femur presented with pain in the left thigh and inability to bear weight following a low-energy fall. Radiographs revealed a subtrochanteric femur fracture, classified as Seinsheimer type IIA [4], passing through a region of sclerotic, expanded bone consistent with pagetic involvement. Baseline investigations showed a markedly elevated serum alkaline phosphatase.

The patient was optimised pre-operatively with bisphosphonate therapy and calcium-vitamin D supplementation. Surgical fixation was performed using a Proximal Femoral Nail Antirotation-A2 (PFNA2) under image intensifier guidance. Intraoperative challenges included distorted medullary canal anatomy, an increased bleeding tendency, and difficulty achieving satisfactory reduction because of

cortical thickening. With careful reaming and controlled nail insertion, fixation was achieved with minimal complications.

Investigations

Laboratory Investigations

Date	Investigation	Result
Not stated*	Alkaline phosphatase (ALP)	217.9
	ALT	17.1
	GGT	39.0
	HIV / HBsAg	Non-reactive / Non-reactive
15/12/24	Urea	35.0
	Creatinine	0.89
	Fasting blood sugar (FBS)	110
16/12/24	T3 / T4 / TSH	1.06 / 14.53 / 4.15
	Prostate-specific antigen (PSA)	1.68
	Urine ketone bodies	Negative
18/12/24	FBS	106
	Sodium / Potassium / Chloride	134.4 / 4.17 / 100.69
	Sodium / Potassium / Chloride	131.8 / 4.80 / 99.69
20/12/24	Haemoglobin	11.5
	Haemoglobin	9.8
	RBC / TLC	3.5 / 7770
	DLC (N/L/E/M)	68 / 20 / 3 / 9
	PCV / Platelets	29.4 / 2.32
	MCV / MCH / MCHC	86.9 / 28.0 / 32.2
	Sodium / Potassium / Chloride	134.8 / 4.32 / 102.85

21/12/24	Urine routine and microscopy	Sugar negative; protein 1+; ketone bodies negative; bilirubin negative; blood negative; pus cells negative; epithelial cells 1-2/hpf; leucocytes 1-2/hpf
26/12/24**	Haemoglobin	10.7

Histopathology

HPE of Bone Biopsy Sample (18/12/24): “Paget’s disease of bone –left femur”.

Microscopy: Fibrocollagenous tissue fragments with thickened, congested blood vessels, with entangled fragments of dead bone. The bony tissue shows haphazard layers of lamellar bone with woven bone and prominent irregular cement lines (mosaic pattern). Osteoclastic and osteoblastic activity is minimal.

Macroscopy: Tiny grey-white to grey-brown soft tissue bits, the larger measuring 1 × 0.7 × 0.5 cm and the smaller 0.7 × 0.5 × 0.4 cm; external surface unremarkable. A bony bit removed from the distal end of the fracture site, measuring 1 × 0.5 × 0.5 cm, was also received in the same container.

Microbiology

Pus culture (23/12/24): No growth.

Radiological Investigations

X-ray Left Hip with Femur, Full-length AP and Lateral (Pre-operative): Pathological fracture of the left proximal third femoral shaft without distal neurovascular deficit (DNVD).

MRI Left Hip with Femur (15/12/24): Paget’s disease of bone, stage 2, involving the left femur and sacrum, with pathological fracture of the proximal shaft of the femur.

X-ray Left Hip with Femur, Full-length AP and Lateral (Post-operative): Well-reduced left proximal third femur fracture with long PFNA2 surgical implant in situ.

Follow-up X-rays, Pelvis AP and Left Hip with Femur AP/lateral (12/08/2025): shown in Figures 1 and 2.

USG abdomen and pelvis (16/12/24): (1) Fatty liver; (2) gall bladder polyp; (3) non-obstructive right renal calculi.

Other Investigations

2D Echocardiography (16/12/24): Normal chambers; mild MR and TR with concentric LVH; EF 60% with normal LV systolic function; normal PA pressure.

Audiological Investigations

Pure-tone Audiometry: Both ears showed a downsloping hearing loss with a pure-tone average (PTA) of 55 dBHL in each ear (Figures 3 and 4). In the right ear, air-conduction thresholds were about 40 dBHL at 250 Hz, 45 dBHL at 500 Hz, 55 dBHL at 1 kHz, 65 dBHL at 2 kHz and 70 dBHL at 4–6 kHz, with bone-conduction thresholds lying close to the air-conduction thresholds. In the left ear, air-conduction thresholds were about 40, 45, 55, 65 and 60 dBHL at 250 Hz, 500 Hz, 1 kHz, 2 kHz and 4–8 kHz respectively.

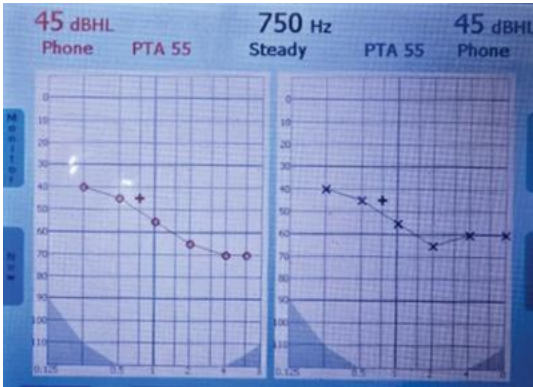


Figure 3. Pure-tone Audiogram, Air Conduction (Right Ear, Left Panel; Left Ear, Right Panel); PTA 55 dBHL Bilaterally.

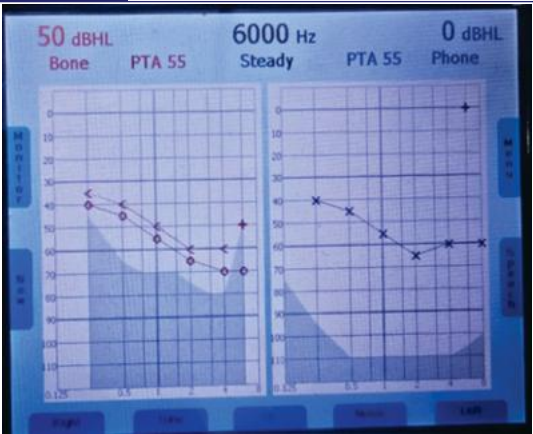


Figure 4. Pure-tone Audiogram with Bone-conduction Thresholds for the Right Ear.

Tympanometry (Right Ear, 226 Hz Probe Tone): Ear canal volume 1.12 ml, peak compliance 0.19 ml, middle-ear pressure 17 daPa and tympanometric gradient 39 daPa (Figure 5).

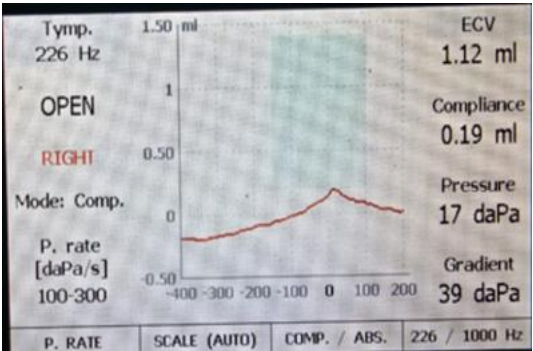


Figure 5. Tympanogram, Right Ear.

Post-operative Course and Outcome

The patient was mobilised with partial weight bearing from postoperative day 5. At 6-month follow-up, radiographs demonstrated satisfactory fracture union with no implant-related complications. Full weight-bearing mobilisation with a walker was started after radiographic confirmation of union. Functional outcome assessed with the Harris Hip Score [5] was 84, indicating a good result. Serum alkaline phosphatase showed a downward trend postoperatively, indicating disease control.

Follow-up radiographs obtained on 12/08/2025 are shown in Figures 1 and 2.



Figure 1. Follow-up AP Pelvis Radiograph (12/08/2025) Showing the Left PFNA2 In Situ.



Figure 2. Follow-up AP (Left) and Lateral (Right) Radiographs of the Left Hip with Femur (12/08/2025).

DISCUSSION

Management of fractures in Paget's disease requires careful surgical planning. Pagetic bone is structurally weak despite its sclerotic appearance, and the combination of deformity, canal distortion, cortical thickening and increased vascularity complicates reduction, reaming and implant placement, as encountered in this case [1,2,6].

The PFNA2 implant uses a helical blade that compacts cancellous bone during insertion, providing enhanced purchase in osteoporotic and sclerotic bone and helping to minimise the risk of cut-out and rotational instability. As an intramedullary, load-sharing device, it also allows early mobilisation, which is desirable in an older patient [6].

Equally important is metabolic control of the underlying disease. Pre-operative bisphosphonate therapy and calcium-vitamin D supplementation [1,3], together with meticulous intraoperative technique, were central to the satisfactory outcome here. The postoperative decline in alkaline phosphatase supports effective disease control. This single case has the limitation of a short follow-up of 6 months, and longer follow-up and larger series are needed to confirm these findings.

CONCLUSION

Subtrochanteric fractures in Paget's disease pose significant surgical challenges because of poor bone quality and deformity. PFNA2 fixation offers a biomechanically stable and effective solution, promoting early mobilisation and good functional recovery when combined with appropriate medical management of Paget's disease.

Learning Points

- Fractures through pagetic bone are challenging owing to sclerosis, deformity, distorted canal anatomy and increased bleeding.
- Pre-operative metabolic control with bisphosphonates and calcium-vitamin D supplementation is important.
- A helical-blade cephalomedullary nail such as PFNA2 provides stable, load-sharing fixation with good purchase in sclerotic bone.

Declarations

Patient Consent: Informed consent taken from the patient

Conflicts of Interest: [None / specify].

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