MENTORS IN ORTHOPEDICS

INFECTED NONUNION FRACTURE NECK OF FEMUR WITH SEVERE HIP JOINT DESTRUCTION IN A CHILD

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SUMMARY

Background: Pediatric femoral neck fractures are infrequent injuries associated with significant morbidity, particularly when complicated by infection and nonunion. Chronic osteomyelitis and septic arthritis in the skeletally immature hip can result in catastrophic outcomes, including physeal destruction, femoral head resorption, and significant limb length discrepancy.

Objective: This report details the clinical presentation and surgical management of a 10-year-old male with an infected nonunion and Choi Type V sequelae following internal fixation of a femoral neck fracture.

Key Points: The patient presented with a 4 cm limb shortening, persistent sinus drainage, and restricted hip motion. Radiographic and magnetic resonance imaging confirmed chronic osteomyelitis with complete resorption of the femoral head and neck. Laboratory analysis identified a multidrug-resistant Pseudomonas infection and hypoalbuminemia. Treatment involved radical surgical debridement, targeted intravenous antibiotic therapy, and nutritional optimization. To address the mechanical instability and proximal femoral migration, a valgus osteotomy was performed. While orthobiologic adjuncts were considered to facilitate osteogenesis, parental refusal necessitated a purely mechanical and pharmacological approach. Postoperative follow-up demonstrated successful infection suppression and improved joint mobility. The residual limb length discrepancy was managed conservatively with a shoe lift, with future epiphysiodesis or limb lengthening planned as the patient approaches skeletal maturity.

Conclusion: Management of infected pediatric femoral neck nonunions requires aggressive debridement and staged reconstruction. Valgus osteotomy serves as an effective salvage procedure to restore hip stability and improve functional outcomes in cases of severe femoral head loss where advanced regenerative therapies are not utilized.

KEYWORDS

Femoral Neck Fractures; Osteotomy; Fractures, Ununited; Osteomyelitis; Leg Length Inequality

INTRODUCTION

Femoral neck fractures in children are uncommon but carry a significant risk of complications, particularly when complicated by infection or delayed union [1]. Pediatric femoral neck fractures are rare and associated with a high risk of complications, particularly when infection and nonunion developed [2]. Septic arthritis, epiphysitis, and chronic osteomyelitis are rare but devastating outcomes that may result in joint destruction and limb shortening [3].

This case illustrates a complex course of an infected nonunion in a child and explores the challenges of treatment, especially when advanced therapies such as orthobiologics are declined.

CASE PRESENTATION

A 10-year-old male presented with persistent left hip pain, limited mobility, sinus infection discharge, and limb length discrepancy. Over a year prior, he had sustained a fracture of the neck of the left femur after falling from a height. The fracture was treated with internal fixation, which later became infected. The implants were removed, but the patient's infection persisted.

Clinical Findings and Imaging

Limb examination: Pain in the groin area that occasionally radiate to the medial side of thigh, limping gait, Left lower limb 4 cm shortening due to resorption of proximal femur and growth disturbance, Limitation of Lt hip motion.

X-ray (AP and lateral views) (Figure 1): showed Widening of the hip joint space, Resorption of the femoral head and neck, Proximal migration of the greater trochanter and Cavitation and sclerosis of upper femur; suggestive of chronic osteomyelitis.

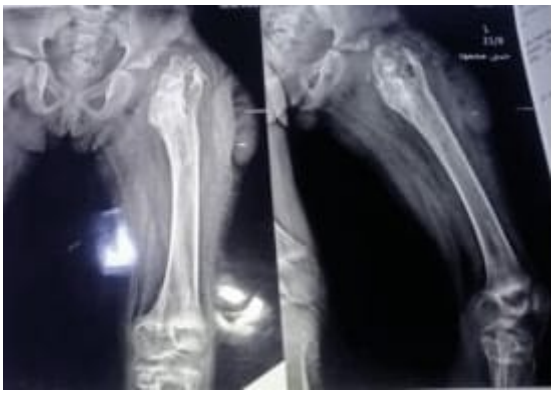

Figure 1: A Choi type V post septic arthritis sequel (this classification will be mentioned below).

MRI: Confirmed findings consistent with septic arthritis, epiphysitis, and chronic osteomyelitis.

Laboratory Investigations

CBC: W.B. Cs= 19.000, ESR= 35 and CRP= 18, Renal and liver function tests: Normal, HbA1c and fasting blood glucose: Normal, Vitamin D, calcium, alkaline phosphatase: Normal, Blood and synovial fluid cultures: pseudomonas bacterial infection resistant to many antibiotics, Plasma protein examination showed hypoalbuminemia.

Management

The patient underwent: Extensive surgical debridement and lavage, correction of hypo-albuminemia, Empirical post culture sensitive IV antibiotics, Valgus osteotomy of the proximal femur to improve joint mechanics and compensate for deformity (Figure 2).

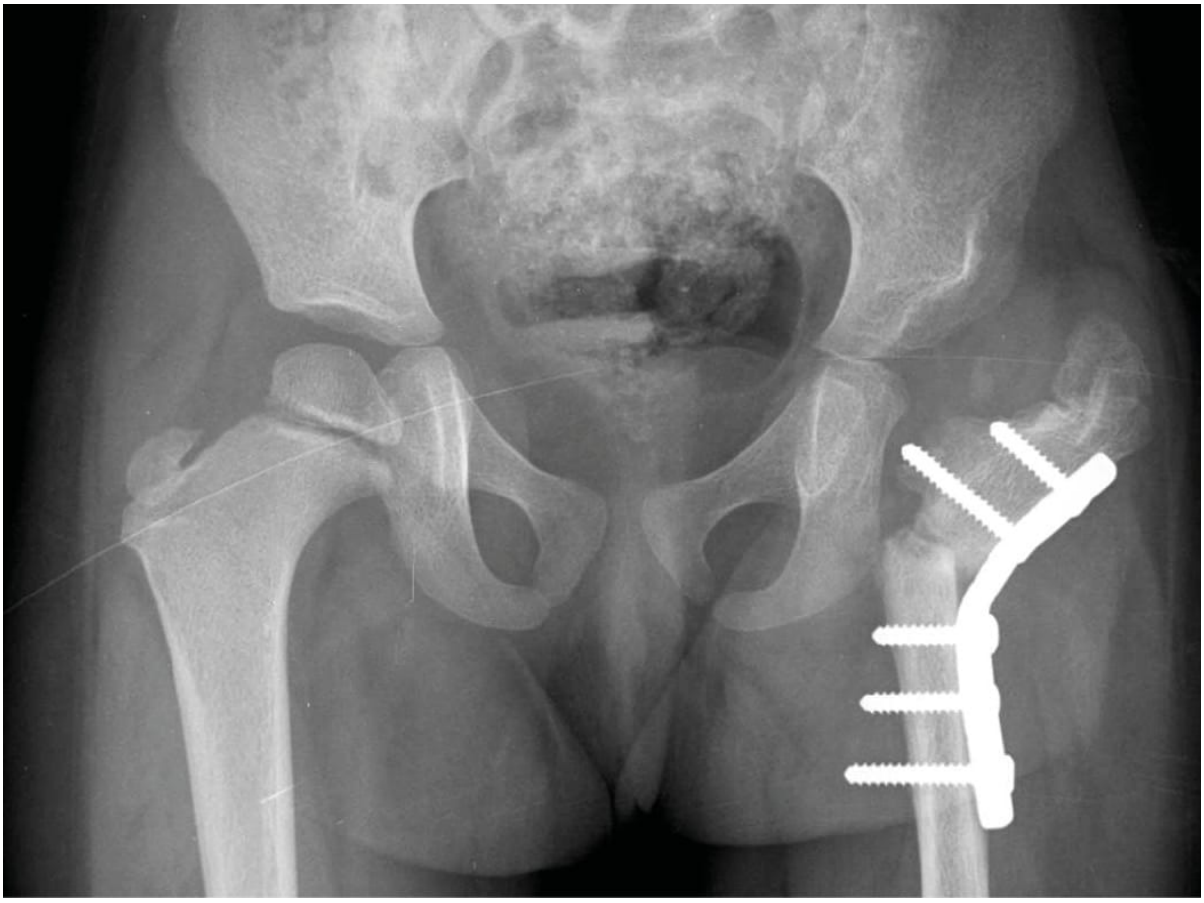

Figure 2: Valgus osteotomy of proximal left femur.

The orthopedic team also considered orthobiologics (e.g., bone graft substitutes, growth factors, or stem-cell-based therapies) as an adjunct to enhance bone healing. However, the family declined all these interventions.

Also, due to significant limb shortening, a custom-made orthopedic shoe was prescribed to compensate for the length discrepancy and improve gait.

Detection of sequelae

As femur head is purely cartilaginous more susceptible to direct destructive activity of pus and inflammatory products, also increased intra-capsular pressure complicated by avascular necrosis of femur head, these lead to absorption of femur head and neck resulting in sever shortening and disability.

Outcome and Follow-Up

Following surgery and rehabilitation, the patient reported improvement in pain and joint mobility. Inflammatory markers normalized, and infection was controlled. He remains under orthopedic and physiotherapy follow-up. While limb shortening persists. He is currently managed non-surgically with a shoe lift. Future surgical plan for limb length discrepancy may be considered as the child grows.

DISCUSSION

This case reflects a rare but serious cascade of complications from pediatric femoral neck fractures, emphasizing: The risk of infection and nonunion following internal fixation [5]. The devastating consequences of chronic joint infection in a skeletally immature child, including growth plate involvement (epiphysitis), osteomyelitis, and femoral head and neck resorption [6].

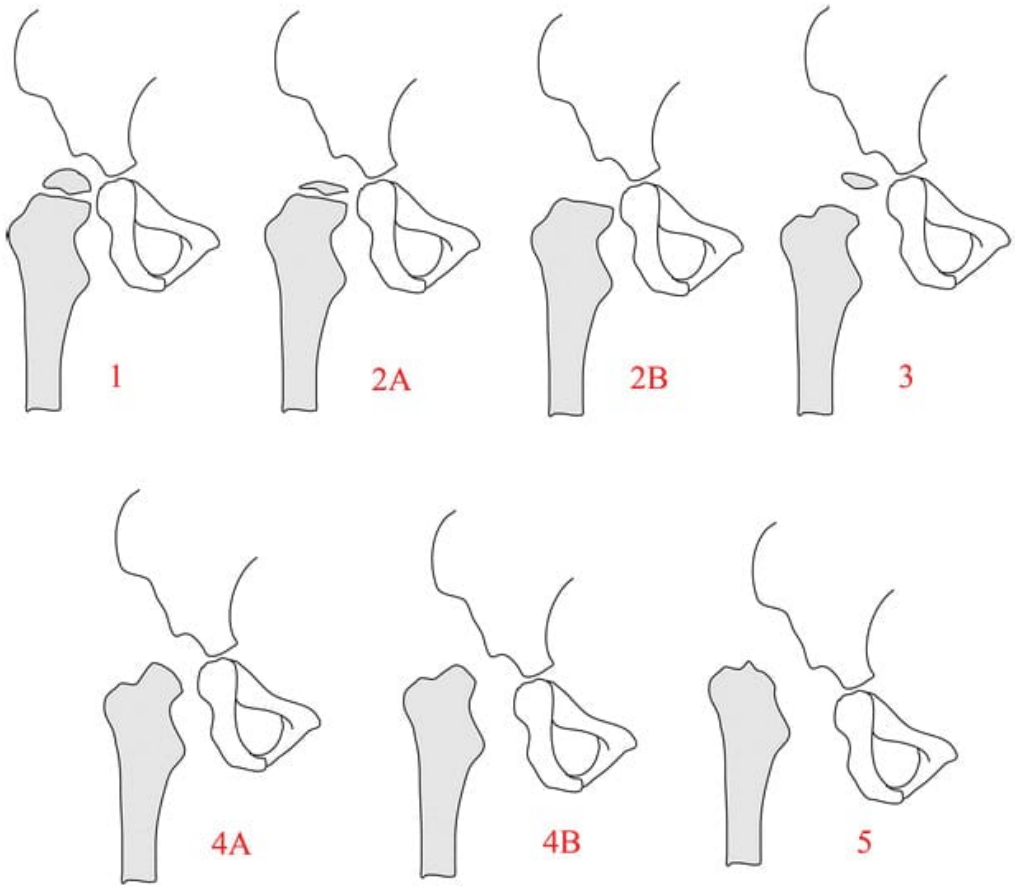

Figure 3: Choi (2006) classification of post-septic hip sequel [4]Figure 3: Choi (2006) classification of post-septic hip sequel [4] / Type 1: no residual deformity up to mild coxa magna, it needs no reconstruction. / Type 2A: coxa brevia with deformed head, it needs observation till skeletal maturity. / Type 2B: progressive coxa vara or coxa valga with asymmetric premature closure of proximal femur physis, it needs surgical intervention to prevent subluxation as epiphysiodesis of remaining physis. / Type 3: slipping at femoral neck with sever anteversion or retroversion, it needs femoral osteotomy to correct version and neck shaft angle. / Type 4A: complete destruction of femoral epiphysis with stable neck segment. / Type 4B: complete destruction of femoral epiphysis with unstable neck segment, it needs greater trochanter arthroplasty. / Type 5: complete destruction of femoral head and neck up to intertrochanteric line with dislocation of the hip, it needs arthrodesis, Ilizarov hip reconstruction or epiphyseal transfer.

Many surgical interventions were described to overcome the resorption of femoral head and neck like Harmon arthroplasty of greater trochanter (Figure 4), L'Epsicopo arthroplasty, Modified Albee arthroplasty (Figure 5), and others [7],[8].

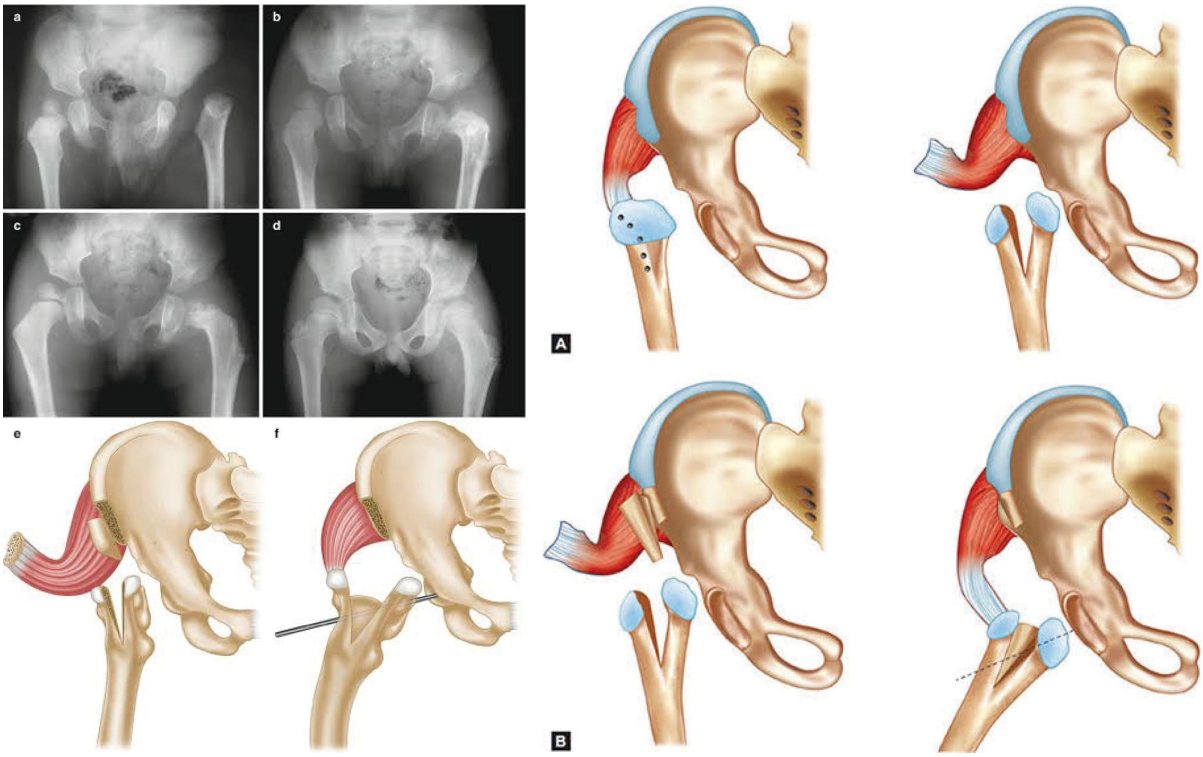

Figure 4: Harmon arthroplasty of greater trochanter (Musculoskeletal Key, Fastest Musculoskeletal Insight Engine, Septic Arthritis In Children, 2010) [9, 10]

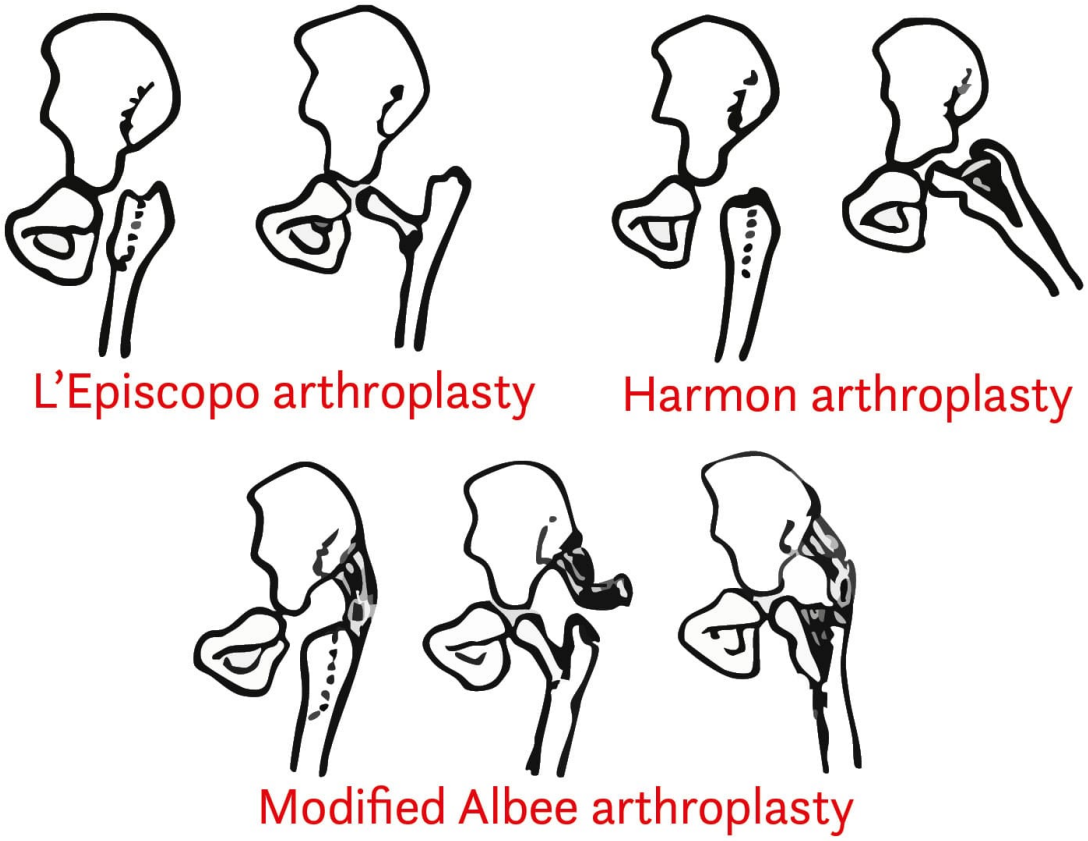

Figure 5: Other arthroplasties for the greater trochanter [11]

The challenge of managing limb length discrepancy, especially when growth potential remains.

The use of orthobiologics—which may include platelet-rich plasma (PRP), bone morphogenetic proteins (BMPs), or stem cells—was considered to promote healing. However, due to family refusal, this modality was not utilized, potentially affecting long-term outcomes. The most important thing is the correlation of hypo-albumeneamia [12], [13].

CONCLUSION

Pediatric femoral neck fractures complicated by infection require multidisciplinary care. Early intervention, infection control, and reconstructive techniques like valgus osteotomy can salvage joint function. When advanced treatment like orthobiologics is declined, supportive options such as orthopedic shoe modification may play an essential role in maintaining mobility and quality of life.

Classification used and Plan of management in septic hip cases

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