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Successful resolution of iliopubic and ischiopubic branch pseudoarthrosis with cannulated screw fixation: A case report

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A B S T R A C T

Background: Pseudoarthrosis of the iliopubic and ischiopubic rami represents a rare complication following pelvic fractures that can lead to debilitating chronic pain and functional disability. Although its clinical feasibility remains anecdotal in the literature, percutaneous cannulated screw fixation may be a viable option in such cases.

Case report: A 61-year-old Caucasian woman presented with atraumatic bilateral pelvic ramus fractures that progressed to hypertrophic pseudoarthrosis despite 14 months of conservative management including magnetotherapy. The patient experienced severe functional impairment (PCS-12: 29.9, pain NRS: 7/10) and required assistive devices for ambulation. Minimally invasive percutaneous cannulated screw fixation was performed using 6.5mm screws (120mm iliopubic, 95mm ischiopubic) under fluoroscopic guidance. At six-month follow-up, complete symptom resolution was achieved with normalized functional scores (PCS-12: 51.9, pain NRS: 1/10) and radiographic evidence of bone union.

Conclusion: Percutaneous cannulated screw fixation represents an effective treatment option for pelvic ramus pseudoarthrosis refractory to conservative management, achieving excellent functional outcomes and pain relief.

1. Introduction

Pseudoarthrosis of the iliopubic and ischiopubic rami presents a rare yet compelling clinical outcome that challenges conventional orthopedic practice.[1–3] While isolated pubic ramus fractures represent one of the most common pelvic injuries in the elderly population, their progression to nonunion occurs in only a very small subset of patients who fail to respond to standard conservative treatment, creating a condition for which the literature remains remarkably sparse despite the significant functional consequences.[4–6,12]

Causes of pseudoarthrosis in the iliopubic and ischiopubic rami can include secondary trauma during primary recovery, inadequate blood supply, infection, or inappropriate conservative treatment in cases requiring surgical fixation. Treatment strategies following pseudoarthrosis of the iliopubic or ischiopubic rami typically include conservative management with bone stimulation, bisphosphonates, and physical therapy; however, surgical reintervention may be required in selected cases.[1,4–9] Although nonunions are rare, reintervention often leads to unfavorable functional outcomes.[1,3] Screw fixation may be utilized to treat pelvic nonunion when mechanical stability is essential for healing.[1,4–9]

This case report presents a 61-year-old patient who underwent percutaneous cannulated screw fixation following hypertrophic pseudoarthrosis of the right iliopubic and ischiopubic rami, demonstrating the successful application of this minimally invasive technique in this clinical scenario.

2. Case presentation

A 61-year-old Caucasian woman presented with a 14-month history of progressive right groin pain without antecedent trauma. Despite the pain, she maintained normal daily activities with weight-bearing as tolerated, managing symptoms with oral analgesics. Her medical history was significant for hypertension, diabetes mellitus, and dyslipidemia, all well-controlled with current medications.

Two months prior to presentation, the patient experienced an acute exacerbation of continuous pain despite the absence of new trauma or other precipitating events, prompting her to seek medical attention.

Physical examination revealed an antalgic gait pattern affecting the right lower extremity, requiring the use of a single crutch for ambulation. No subjective or objective leg length discrepancy was observed. Palpation of the right groin elicited tenderness with a Numerical Rating

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Scale (NRS) score of 7/10. Range of motion assessment demonstrated active hip flexion from 0° to 100° with pain at terminal flexion and external rotation. Functional assessment using the Short Form-12 Health Survey revealed significantly impaired quality of life with a Physical Component Score (PCS-12) of 29.9 and Mental Component Score (MCS-12) of 33.9, indicating substantial physical and psychological impact.

Radiographic evaluation revealed non-union of the right iliopubic and ischiopubic rami. Computed tomography (CT) confirmed the non-union with hypertrophic characteristics (Fig. 1). Given the atraumatic nature of the fractures in this demographic, the differential diagnosis included pathological fracture secondary to metastatic disease, primary bone malignancy, or metabolic bone disorders. Consequently, total-body bone scintigraphy was performed, demonstrating increased radiotracer uptake in the right ilio-ischio-pubic region and mild hyperactivity of the right sacroiliac joint, with no other areas of abnormal uptake.

These imaging findings, combined with the clinical presentation, supported the diagnosis of hypertrophic pseudoarthrosis.

Following comprehensive informed consent regarding available treatment options, the patient initially underwent conservative management for 12 months, including analgesic medication, activity modification, and pulsed electromagnetic field therapy.

When no improvement in gait or pain occurred, the patient consented to surgical intervention.

The procedure was performed under spinal anesthesia with prophylactic administration of 2 g of intravenous cefazolin. The patient was positioned supine on a radiolucent operating table under continuous fluoroscopic guidance. A minimally invasive approach utilizing percutaneous cannulated screw fixation was employed.

The first incision was made lateral to the anterior superior iliac spine for guide wire insertion and placement of a 6.5mm LIMA cannulated screw (LimaCorporate, Milano, Italy) in the right iliopubic ramus (Fig. 2A). Following cortical drilling, a 120mm cannulated screw was inserted. The second incision was made at the level of the pubic symphysis for guide wire placement in the right ischiopubic ramus (Fig. 2B). After cortical preparation, a 95mm cannulated screw was positioned. Final fluoroscopic control confirmed appropriate screw placement (Fig. 2C). The surgery time was 55 minutes.

Postoperatively, the patient achieved excellent pain control and was permitted weight-bearing as tolerated with bilateral crutch assistance on postoperative day one. Discharge was accomplished on postoperative day two with opioid-free oral analgesics and anticoagulation prophylaxis.

At one-month follow-up, clinical improvement was evident with pain reduction to NRS 3/10 and improved functional scores (PCS-12: 37.4, MCS-12: 39.9). The patient had progressed to ambulation without assistive devices, and radiographic assessment confirmed satisfactory hardware fixation without loosening.

At six-month follow-up, the patient reported complete symptom resolution with minimal residual pain (NRS 1/10) and substantial improvement in quality of life measures (PCS-12: 51.9, MCS-12: 48.3). Final radiographic evaluation demonstrated progressive fracture consolidation with evidence of bone union (Fig. 3). No adverse events or complications were encountered during the follow-up period, with excellent functional outcomes and return to pre-injury activity levels maintained at final assessment.

3. Discussion

Ileopubic or ischiopubic fractures of the pelvis are characteristic of advanced age and typically heal well without the need for surgical interventions. Nevertheless, patients may require prolonged hospitalization and weight-bear restriction or limitations, and those with extended hospital stays are unlikely to return to their previous functional status.[4,5]

Occasionally, these fractures develop complications including pseudoarthrosis or malunion, resulting in severe chronic pain and daily-life activity impairment. In such cases, surgical intervention utilizing percutaneous fixation with cannulated screws represents a viable treatment option, as demonstrated by the current clinical case.

Proper screw positioning provides fracture stability and promotes healing while relieving pain and enabling immediate weight-bearing. Moreover, percutaneous technique can offer significant advantages over open reduction and internal fixation with plate constructs, which can result in wound and soft tissue complications.[5] This cannulated screw technique obviates the need for extensive surgical exposure and avoids complications associated with anterior pelvic plating, including increased perioperative infection risk and hardware prominence.[4,10–12] Additionally, minimally invasive percutaneous screw fixation presents an inferior surgical time and a may present a lower learning curves, as it has extensively demonstrated for Closed Reduction Internal Fixation over Open Reduction Internal Fixation.[13–15] However, biomechanical studies of unstable anterior pelvic ring fractures have demonstrated equivalent performance between retrograde intramedullary screws and conventional plating techniques.[9]

Patient anatomy represents a critical consideration. The pelvis contains numerous vital structures, making thorough anatomical assessment of the pelvic branches intended for fixation essential. Excessive curvature of pelvic branches may complicate accurate intramedullary screw placement. Improper positioning of guide wires or screws into extra-skeletal regions can potentially damage vascular and neural structures, causing permanent injury. Moreover, sdditional variables, particularly patient weight in high-BMI individuals, may further complicate the surgical procedure. Therefore, proficient use and interpretation of intraoperative pelvic fluoroscopy is advised to ensure appropriate screw positioning within the pseudoarthrosis site while avoiding complications, especially in the early learning curve phases. An alternative approach involves cement osteoplasty, as proposed by Kamysz et al.,[16] which may prove particularly beneficial in cases of atrophic pseudoarthrosis with significant gaps between bone fragments.

The current technique may also be widely favourable in case of primary acute ileopubic and/or ischiopubic fractures, even in those cases where indication is uncertain. Immediate full-weight-bearing, early discharge, limited surgery time and opioid-free pain management could provide an efficient, cost-effective, and accurate treatment

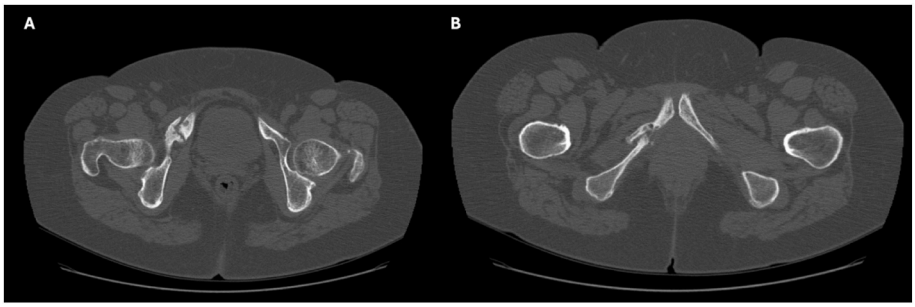

Fig. 1. Preoperative TC axial view of pelvis. A. Hypertrophic nonunion of the iliopubic branch. B. Hypertrophic the ischiopuic branch.

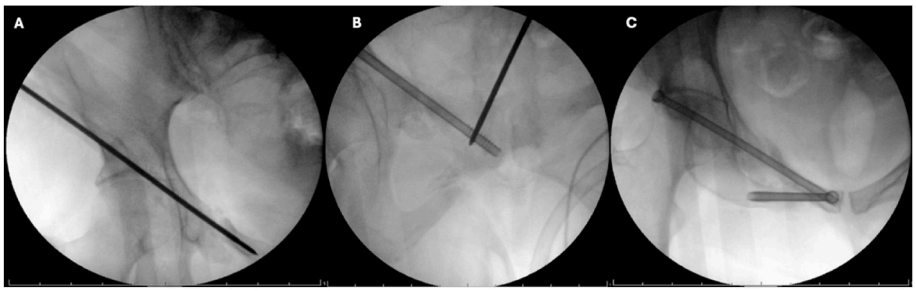

Fig. 2. Intraoperative fluoroscopic images during the positioning of the K wires. A. Iliopubic branch. B. Ischiopubic branch. C. Correct reduction of the iliopubic and ischiopubic screw.

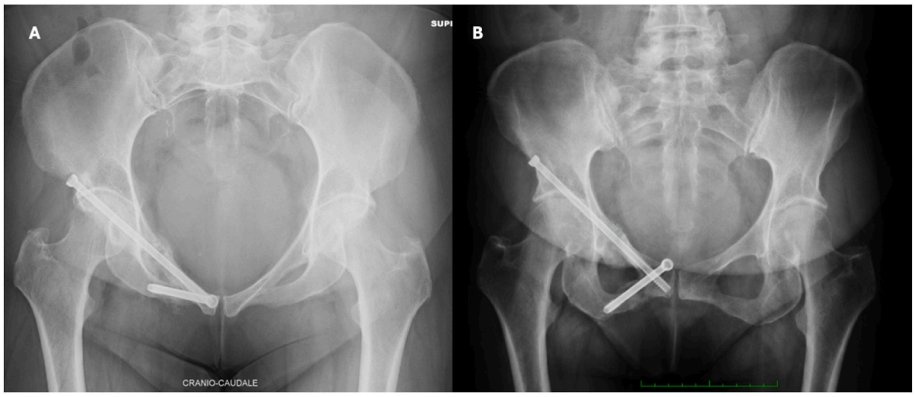

Fig. 3. X-Ray assessment at 6 months of follow-up. A. Outlet view. B. Inlet view.

strategy for both adults and octogenarians, promoting fracture stability, optimizing healing, and limiting the chance for prolonged hospitalization and illness.

The procedure requires comprehensive preoperative anatomical assessment of the patient's pelvis combined with expert intraoperative fluoroscopic guidance to ensure proper screw positioning without complications. The favourable postoperative outcomes highlight the importance of individualized surgical strategies in managing complex pelvic pathology, providing guidance for clinicians encountering similar clinical scenarios.

Percutaneous cannulated screw fixation has proven to be an effective technique and should be incorporated into treatment algorithms for pelvic fractures, both in case of acute naive fracture and chronic pseudoarthrosis or malunion.

In summary, this case report presented a rare but debilitating complication of pelvic fractures and demonstrating a successful minimally invasive treatment approach. The progression from severe functional disability requiring assistive devices to complete symptom resolution with return to early normal activities shows the transformative potential of percutaneous cannulated screw fixation in treating refractory pelvic pseudoarthrosis. Given the paucity of literature on this specific condition and the substantial morbidity associated with failed conservative management, this case provides clinical evidence supporting the efficacy and safety of a minimally invasive surgical solution that can restore quality of life and functional independence in the affected population. This technique may serve as a reference for orthopaedic surgeons managing similar cases where traditional conservative approaches have failed.

Ethics approval

The study was conducted in accordance with the Declaration of Helsinki.

Ethic statement

Informed consent was obtained from the participant included in the study.

CRediT author statement

The study was conceptualized by MI, RC, and DAC. Surgical procedures involved in the investigation were performed by MI, RC, and DAC. Data collection and curation were performed by MC and AB. The first draft of the manuscript was written by FL, and all authors commented on subsequent versions of the manuscript. All authors edited and approved the final manuscript.

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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