Case report

# Two cases of pubic fracture potentially resulted from overt compression by hip positioners during total hip arthroplasty

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**Abstract:** Here, we present two cases of pubic fractures potentially caused by forced compression from hip positioners during total hip arthroplasty. Both patients were females and underwent surgery in the lateral decubitus position. The surgeries were uneventful, and postoperative radiography revealed no abnormalities. However, both reported pubic pain immediately after surgery that persisted for 2 months before resolution. Follow-up radiographs revealed pubic fractures that were not visible on initial postoperative radiographs. None of the patients had risk factors for fragile fractures or had experienced postoperative trauma. Since both females underwent surgery in the lateral decubitus position and reported pain immediately afterward, we concluded that the pubic fractures were most likely caused by forced compression from the hip positioners during surgery. The fractures were conservatively treated in both patients without complications. During total hip arthroplasty, excessive pelvic compression may increase the risk of pubic fractures. Using the anterior superior iliac spine as the anterior compression point rather than the pubis may provide a safer alternative.

**Key words:** Total Hip Arthroplasty ／ Lateral Decubitus Positioner ／ Pubic Fracture

## Introduction

Hip arthroplasty is typically performed in the supine or lateral decubitus positions. The lateral decubitus position offers a better surgical field exposure and easier intraoperative dislocation testing than the supine position. However, rigorous anterior-posterior compression must be applied to the pelvis using hip positioners to stabilize the pelvis during surgery. Although this procedure can potentially cause unintended complications, there are only a few reports on this issue. In this study, we present two cases of pubic fractures suspected to be caused by compression from hip positioners during total hip arthroplasty (THA).

## Case Presentation

Case 1

A 74-year-old female, who had undergone THA for right hip osteoarthritis 14 years prior, visited our hospital complaining of right hip pain. Imaging and clinical findings led to the diagnosis of prosthesis loosening, and revision THA was planned. Surgery was performed in the left lateral decubitus position using hip positioners without any noticeable issues. Postoperative radiography revealed no abnormalities (Figure 1A). However, the patient complained of pubic pain immediately afterward. The pain persisted even after her gait was stabilized 2 weeks after surgery and was finally resolved by 2 months.

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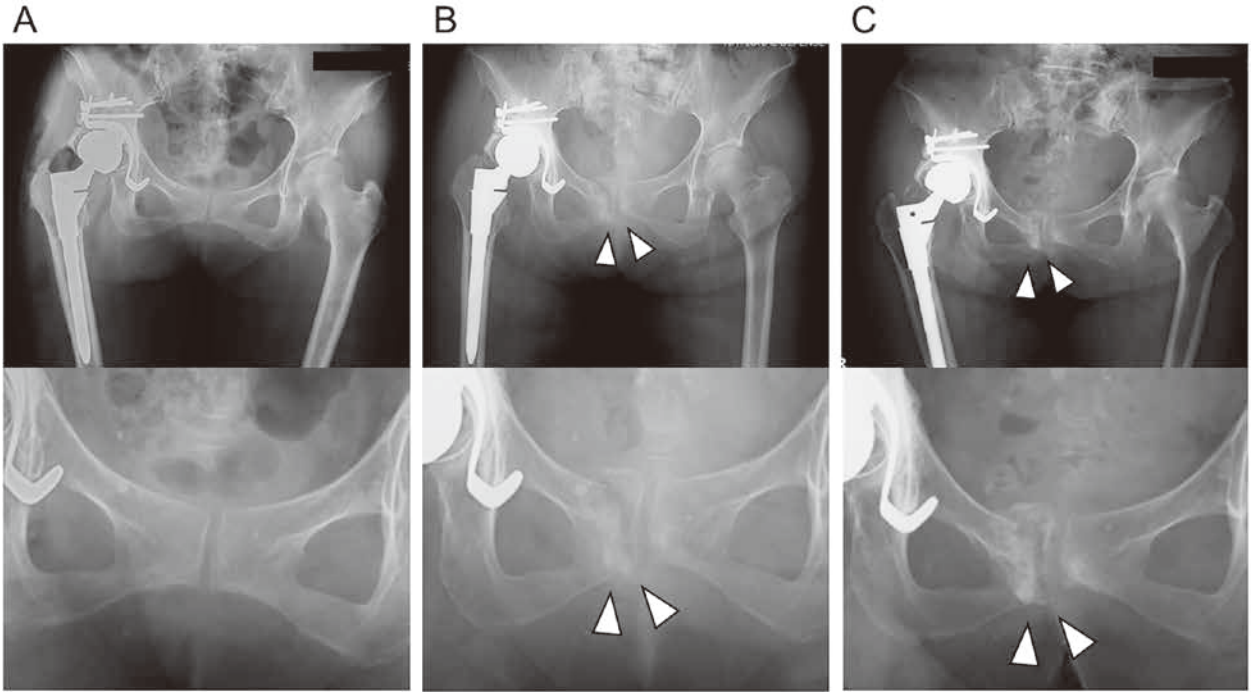


Figure 1.
Radiographic images of Case 1. The full view images of the pelvis (upper row) and the magnified images of the pubis (lower row). A: No abnormalities are present in the pubic region in the X-ray taken immediately after surgery. B: The X-ray taken two months after surgery shows a fracture with slight displacement and a callus in the right pubis. C: The fracture appears fully healed in the X-ray taken five months after surgery. White arrowheads indicate the fracture site.

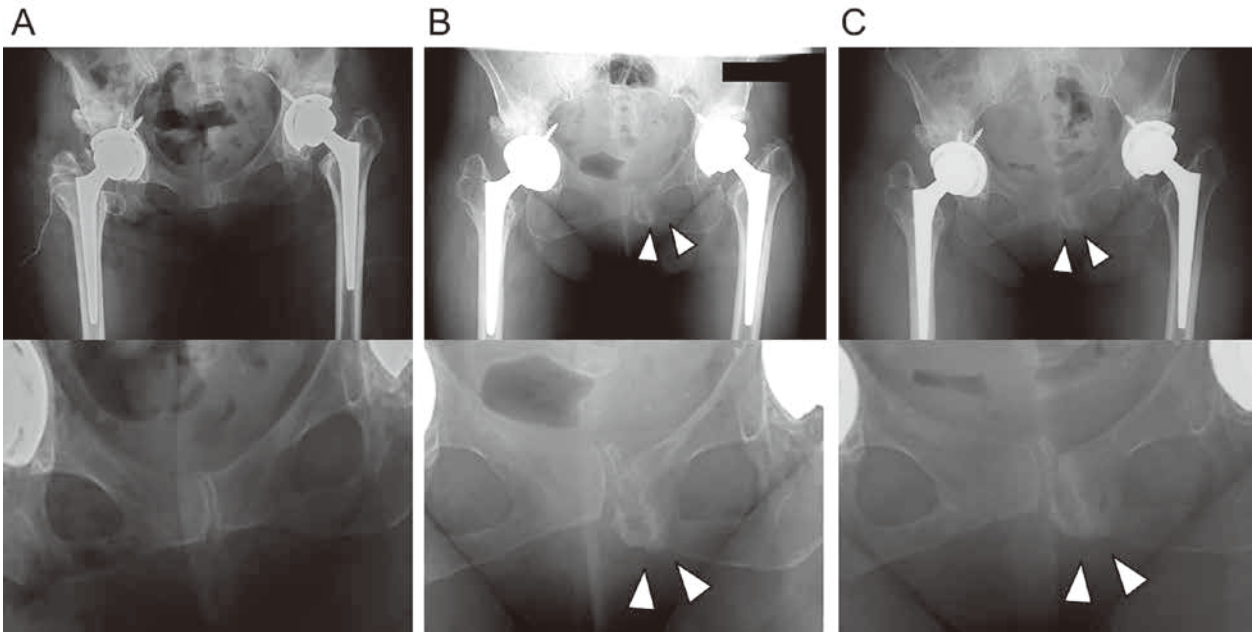


Figure 2.
Radiographic images of Case 2. The full view images of the pelvis (upper row) and the magnified images of the pubis (lower row). A: No abnormalities are present in the pubic region in the X-ray taken immediately after surgery. B: In the X-ray taken three months after surgery, a fracture with slight displacement and a callus is observed in the right pubis. C: The fracture appears fully healed in the X-ray taken five months after surgery. White arrowheads indicate the fracture site.

Radiographic examination performed 2 months after the surgery revealed a fracture with slight displacement and callus formation in the right pubis (Figure 1B). Given the absence of any apparent traumatic episodes, we assumed that the fracture was caused by overt compression of the pelvis by the hip positioners during surgery. Because the fracture was minimally displaced and the pain resolved, conservative treatment was selected. Five months after surgery, bone union was confirmed (Figure 1C). She has experienced no recurrence of pain since then.

Case 2

A 56-year-old female underwent THA for right hip osteoarthritis at our hospital. Surgery was performed in the left lateral decubitus position using hip positioners. The surgery was uneventful and postoperative radiographs showed no abnormalities (Figure 2A). However, she experienced pubic pain immediately after surgery. Her gait stabilized 2 weeks postoperatively, but the pain persisted for more than 2 months before resolution. Radiographic examination performed 3 months after surgery revealed a fracture with slight displacement and callus formation in the left pubis (Figure 2B). Similar to Case 1, the patient had no apparent traumatic episodes, suggesting that the fracture resulted from pelvic compression from the hip positioners. Bone union was confirmed 5 months after the surgery (Figure 2C). The patient reported no symptom recurrence.

## Discussion

Pubic fractures often occur several months after THA because of chronic mechanical stress[1]. Possible factors that contribute to this condition include poor bone quality and increased physical activity[2]. Fukunishi reported that 11 of 171 patients with rheumatoid arthritis who underwent THA had a pubic fracture at some point after surgery, supporting the fact that low bone quality is associated with this condition[3]. In contrast to these cases, wherein fractures occurred weeks or months after surgery, our patient reported pain immediately after surgery, indicating a pubic fracture at the time of surgery. None of the patients had any of the aforementioned risk factors or traumatic episodes after surgery. Because both patients underwent hip surgery in the lateral decubitus position using hip positioners, we concluded that they most likely sustained a fracture caused by compression from the hip positioners. To our knowledge, no reports have described pubic fractures resulting from compression by hip positioners, as observed in our cases. However, considering that hip positioners are often used in elderly patients with low bone mass during surgery, this condition may not be uncommon, as initially assumed. Importantly, our cases suggest that the fracture may not be visible on radiographs taken immediately after surgery. Furthermore, pain from the fracture can be mistaken for surgical pain because of its proximity to the hip. Consequentially, we suspect that this condition can easily be overlooked even if patients complain of postoperative pubic pain.

The pubic fractures observed in our patients can be classified as anteroposterior compression type 1 and type A3 fractures according to the Young-Burgess classification[4] and the AO classification[5], respectively. Because these fractures are caused by low-energy trauma, they can also be classified as type 1a fragility fractures of the pelvic ring according to the Rommens classification[6]. In all these classification systems, conservative treatment is recommended for this type of fracture. Accordingly, both patients were treated conservatively without any complications.

At our institution, we use Wakasugi hip positioners, which are applied to the pubis or anterior superior iliac spine to stabilize the pelvis during hip surgery performed in the lateral decubitus position. After encountering these two cases, we began applying hip positioners

exclusively to the anterior superior iliac spine. Since implementation of this change, we have not encountered any additional cases of pubic fractures.

In conclusion, we present two cases of pubic fractures that likely resulted from overt compression by hip positioners during THA. As this condition can be overlooked, and the fracture may heal without intervention, the incidence of this complication may be significantly underestimated. We suggest that hip positioners be applied mainly to the anterior superior iliac spine during THA to avoid this unintended event.

## Conflict of Interest

The authors declare that they have no conflicts of interest.

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# 人工股関節全置換術時の側臥位支持器による圧迫が原因と推測される恥骨骨折が発生した２例

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**要旨**：今回我々は，人工股関節全置換術時の側臥位支持器による圧迫が原因と推測される恥骨骨折２例を経験したため，文献的考察を含め報告する。症例１，74歳女性。右人工股関節のゆるみに対して人工股関節再置換術を施行した。術直後から恥骨部痛を訴え，歩行が安定した術後２週時点でも疼痛は持続していた。術後２か月で疼痛は消失したが，その際のレントゲン写真で右恥骨に軽度の転位と仮骨形成を認め，恥骨骨折と診断された。保存療法で骨癒合を確認した。症例２，56歳女性。右変形性股関節症に対して人工股関節全置換術を施行した。術後レントゲン写真で異常は認めなかったが，術直後から恥骨部の疼痛を自覚した。術後２週時点で歩行は安定したが，恥骨部痛は術後２か月以上継続し，その後消失した。術後３か月のレントゲン写真で左恥骨の軽度の転位と仮骨形成を認め，恥骨骨折と診断された。保存療法で骨癒合を確認した。今回の２症例はいずれも骨折リスクの高い患者には該当せず，明確な外傷も認めなかった。２症例に共通している事項として，側臥位支持器で強く圧迫されたこと，術直後から恥骨部痛を自覚したこと，が挙げられる。このことから，側臥位支持器による強い骨盤圧迫により恥骨骨折が発生したと推測される。

**索引用語**：　人工股関節全置換術　／　恥骨骨折　／　側臥位支持器

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