While intraoperative computer-navigation for total knee replacement (TKR) has become standard-of-care in many parts of the world, comparable applications in the hip show far less universal uptake. Highlighting this disparity, while the internationally-renown Australian National Joint Replacement Registry records 132,211 computer-navigated primary TKRs in its most recent edition, it presents data for not one computer-navigated total hip replacement (THR).

While no robust data yet support the long-term benefit of such technology over conventional means, short-term results are promising. As with the adoption of any new technology-assisted approach, the uptake of navigated THR utilization has heralded a new suite of technique-specific potential complications. One such example—not usually seen with conventional instrumented THA—pertains to complications related to the insertion and use of fixed pelvic array trackers. This case report describes the unusual circumstance of retained local bony debris generated through application of self-drilling, self-tapping iliac crest pins (for rigid navigation tracker placement) being mis-interpreted on advanced imaging—at a hospital site remote from the index surgery—as an aggressive, early-stage, chondrosarcomatous lesion. This case highlights the critical importance of both a general awareness of common imaging findings after navigated THA surgery (whereby tracker pins have been employed) and the value of ‘hands on’ clinical assessment of patients to allow correlation with suspicious imaging findings.

ABSTRACT

Once purely the domain of knee surgery, the use of computer-navigated techniques in total hip arthroplasty (THA) is becoming progressively more commonplace. As with the adoption of any new technology-assisted approach, the uptake of navigated THA utilization has heralded a new suite of technique-specific potential complications. One such example—not usually seen with conventional instrumented THA—pertains to complications related to the insertion and use of fixed pelvic array trackers. This case report describes the unusual circumstance of retained local bony debris generated through application of self-drilling, self-tapping iliac crest pins (for rigid navigation tracker placement) being mis-interpretated on advanced imaging—at a hospital site remote from the index surgery—as an aggressive, early-stage, chondrosarcomatous lesion. This case highlights the critical importance of both a general awareness of common imaging findings after navigated THA surgery (whereby tracker pins have been employed) and the value of ‘hands on’ clinical assessment of patients to allow correlation with suspicious imaging findings.

KEY WORDS: Computer navigation, computer-assisted surgery, pin site debris, total hip arthroplasty

Case Presentation

An 86-year-old female was referred for evaluation of a painful native left hip. Diagnosed with advanced osteoarthritis [Figure I], she consented for a THR. Preoperative digital templating was performed, and appropriate implants were selected. At the discretion of the operating specialist, the case performed using the Intellijoint HIP® 3D min-optical navigation tool (Intellijoint Surgical Inc., ON, Canada). This case report describes the unusual circumstance of retained bony debris generated from self-drilling, self-tapping iliac crest navigation pins being misinterpreted on advanced imaging—at a hospital site remote from the index surgery—as an aggressive, early-stage, chondrosarcomatous lesion.
The operation was performed without complication, employing a routine posterior approach, an uncemented implant construct, the Intellijoint® navigation system, and otherwise standard surgical technique. Facilitating navigation utilization, two 4.0 mm pins were placed into the ipsilateral iliac crest. The patient mobilized independently on day one and recovered unremarkably. She was seen postoperatively at 2 and 8 weeks [Figure 2] with a stable hip, no clinically-appreciable leg length discrepancy, and was “extremely happy” with her result.

Unfortunately, 4 months after surgery, the patient fell heavily onto her operative side having been knocked over by a large dog (45 kg). She was transported to the local emergency department (remote to the site of her index hip surgery), where X-rays demonstrated a Vancouver B2-type periprosthetic fracture. A 3D computed tomography (CT) scan[9] was performed for the assessment of fracture propagation and host bone stock.

The metal-artifact-reduced (MAR) CT scan was reported by an experienced senior radiologist describing the oblique peri-prosthetic fracture with a displaced greater trochanteric fragment. However, the report flagged a “sclerotic lesion showing prominent periosteal reaction” associated with the “left iliac bone” [Figure 3a and b]. This concerning finding was communicated directly to the referring emergency physician with a presumptive incidental diagnosis of an “aggressive, early-stage, pelvic chondrosarcoma.” Metastasis was raised as a differential, reinforced by a known strong family history of malignancy. The patient was referred to the regional orthopedic oncologic service and a tertiary transfer arranged. A MAR magnetic resonance imaging (MAR MRI) and single-positron emission CT (SPECT) scans were ordered for staging.

At this point, the index hip surgeon was contacted (<24 h post-fall). A review of the preoperative imaging did not show evidence of a comparable lesion and the rapidity of evolution was questioned. Correlation of the radiographic lesion location with a physical assessment of the patient confirmed the subjacent relationship to the previous pelvic pin sites. Discussed directly with the reporting radiologist, the patient’s full relevant imaging catalog was reviewed via picture archiving and communication system (PACS). An amendment to the gazetted CT report was issued reflecting “periosteal and cortical features in keeping with the location and insertion of recent surgical navigation pins to the left iliac crest.” The ordered MRI and SPECT scans were cancelled. Repeat imaging at 4 months post-revision surgery (i.e., 7.5 months post-index surgery) showed complete resolution of the sclerotic/periosteal features.

**Discussion**

In general, pins utilized for pelvic tracker securement are self-drilling/self-tapping to add both convenience and safety allowing single-pass insertion. While—when appropriately placed—these pins provide a stable platform for rigid tracker attachment,[10] their insertion generates local cortical bony debris as the flutes advance. The MIS insertion of these pins through a protective sleeve, through mini-stab incisions in the overlying skin, creates a potential for subcutaneous retention of particulate bony debris – even following thorough washout and lavage. Should the patient find a clinical need for detailed imaging to this region (especially CT-based) post-surgery—but before natural resorption of this material—in the uninformed setting, the potential for misdiagnosis exists. Given the significance of the differentials that might reasonably be raised by the radiographic appearances observed, especially around the iliac crests, the possibility of resultant unnecessary physical
morbidity (and major psychological angst) is not trivial. To the author’s knowledge, this is the first published report of such a misinterpretative diagnosis in mainstream English literature.

Declaration of patient consent
The author certifies that appropriate patient consent was obtained.

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Conflicts of interest
There are no conflicts of interest.

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