55 year-old male with right hip pain after fall.


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Frieda Feldman[1]
Ronald B. Staron

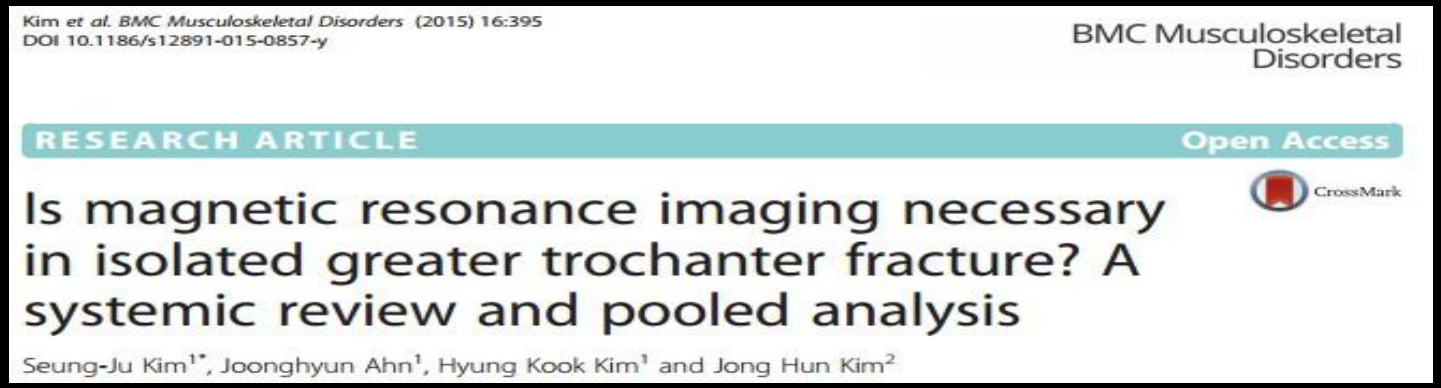
# MRI of Seemingly Isolated Greater Trochanteric Fractures

**OBJECTIVE.** The objective of this article is to show that greater trochanteric fractures commonly perceived on routine radiographs as isolated are often neither isolated nor minor and that MR images can serve as a basis for more informed treatment by revealing the actual extent of such fractures in acute posttraumatic settings.

**CONCLUSION.** A pitfall in diagnosing seemingly isolated greater trochanteric fractures on routinely used imaging techniques lies in the fact that the injuries usually involve a large anatomic area. In our experience, MRI more accurately defines the true geographic extent of greater trochanteric fractures sustained through acute trauma than do radiography and bone scintigraphy and thus could provide a more reliable basis for anticipating complications and for planning appropriate treatment.

- 37 pts (12 M and 25 F; age range 50-95 yo) over a 13 year period (1990-2003) who fell in hospital or presented to ED after fall
- initial radiographs showed greater trochanteric (GT) fractures
- MRI revealed more complex injuries in 35 pts (95%)

Feldman F, Staron RB. *AJR* 2004; 183: 323-329



Kim et al. BMC Musculoskeletal Disorders (2015) 16:395
DOI 10.1186/s12891-015-0857-y

BMC Musculoskeletal Disorders

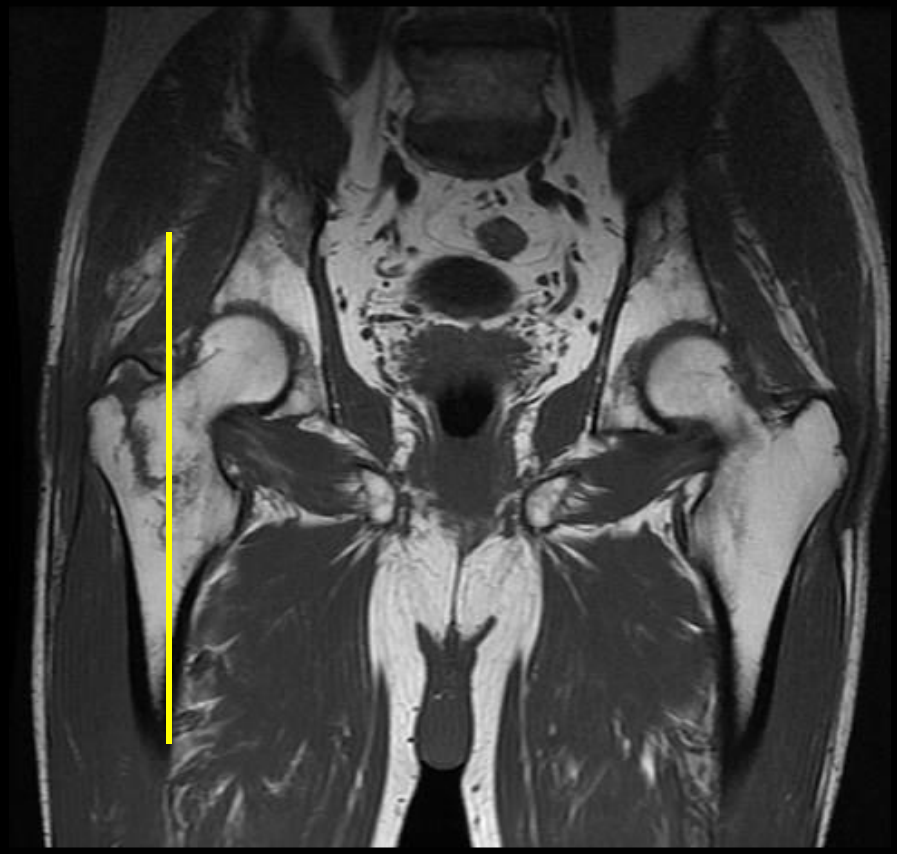
RESEARCH ARTICLE Open Access

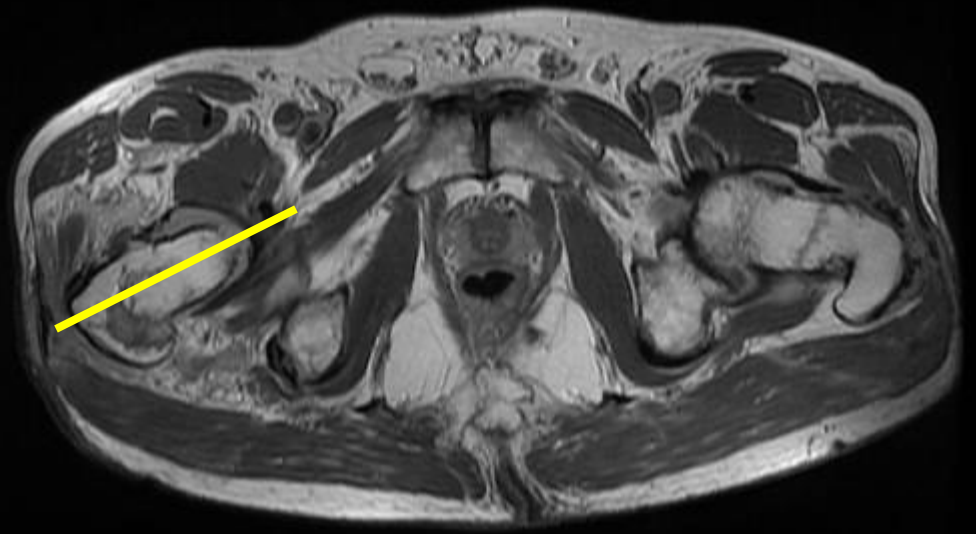
Is magnetic resonance imaging necessary in isolated greater trochanter fracture? A systemic review and pooled analysis

Seung-Ju Kim[1*], Joonghyun Ahn[1], Hyung Kook Kim[1] and Jong Hun Kim[2]

- 110 pts from 7 studies between 2000-2013
- Of those 110 pts, only 11 (10%) had isolated GT fracture on MR
- Of those 99 pts with intertrochanteric extension, 76 (77%) showed extension more than half way to the medial cortex
- Of those 110 pts, 61 (55%) had surgery and dynamic hip screw (DHS) was the most commonly used device for internal fixation

Kim SJ, Ahn J, Kim JH. *BMC Musculoskeletal Disorders* 2015; 16: 395





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Index terms:
Femur, fractures, 443.411
Femur, MR, 443.121411, 443.121415
Hip, fractures, 443.411
Hip, MR, 443.121411, 443.121415

Radiology 1999; 211:237–240

# Incomplete Intertrochanteric Fractures: Imaging Features and Clinical Management[1]

- 312 pts from 1992-1998 with clinically suspected hip fracture who had a MR, 31 pts (22 F and 9 M; age range, 65-96 yo; mean age, 82 yrs) had MR diagnosis was incomplete intertrochanteric fracture
- in the coronal plane 19 (61%) did not reach midline and 12 (39%) reached or crossed midline
- all crossed midline in the axial plane

Shultz E, et al. *Radiology* 1999; 211: 237-240

**TABLE 1**
**Intertrochanteric Fracture Characteristics**

| Characteristic | Treatment: Surgery | Treatment: No Surgery |
|---|---|---|
| Total no. of fractures | 18 | 13 |
| Average age (y) of patients | 82 | 83 |
| Average length (cm) of fracture | 4.9 | 4.6 |
| No. of fractures of the greater trochanter | 11 (61) | 8 (62) |
| No. of fractures crossing the midline | | |
| In axial plane | 15 (100)* | 13 (100) |
| In coronal plane | 9 (50) | 3 (23) |

Note.—Numbers in parentheses are percentages.
* Three of the 18 patients did not undergo axial imaging.

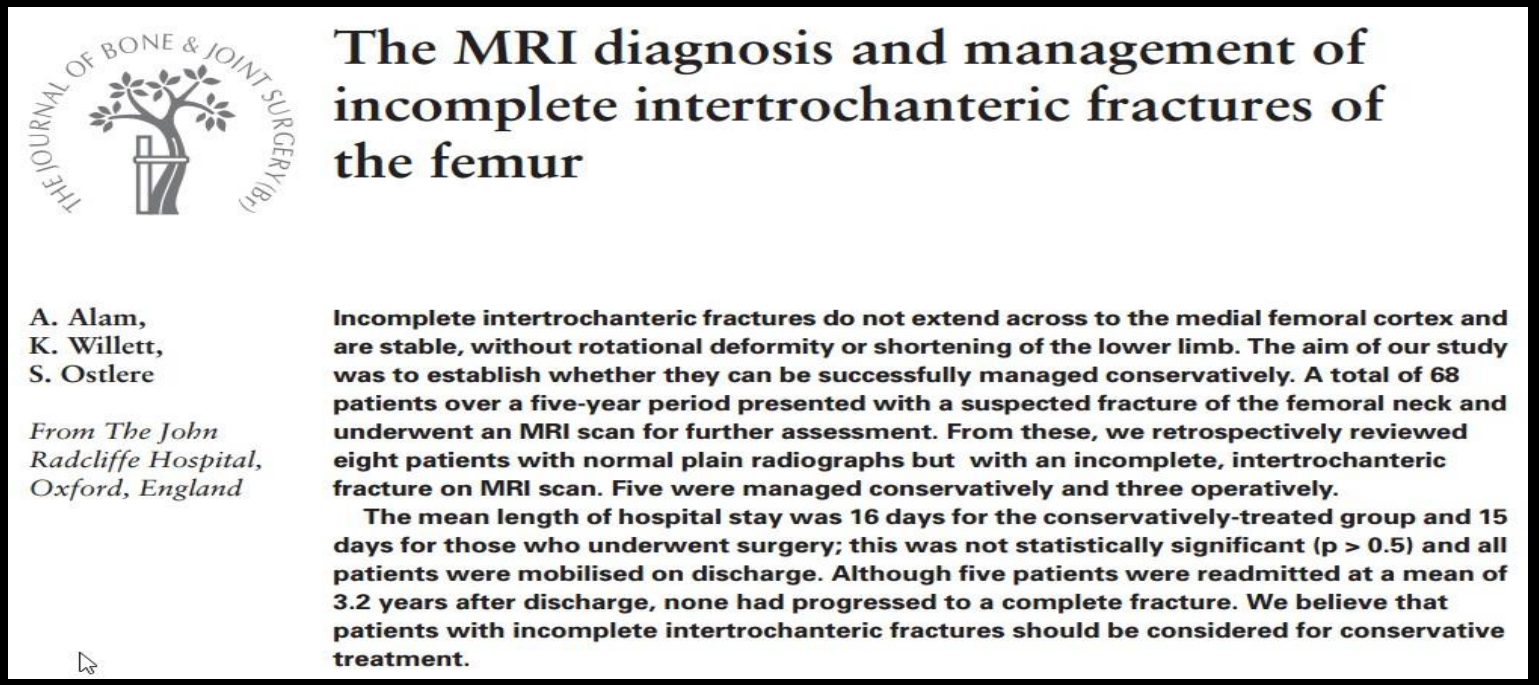
**TABLE 2**
**Patient Data**

| Data | Treatment: Surgery* | Treatment: No Surgery |
|---|---|---|
| Average time (d) | | |
| From injury to MR imaging | 0.8 | 2.5† |
| From MR imaging to surgery | 1.7 | NA |
| From injury to surgery | 2.5 | NA |
| From surgery to ambulation | 5.0 | NA |
| From injury to ambulation | 7.5 | 9.6‡ |
| Follow-up | | |
| Condition | Good | Good |
| No. of patients | 7 | 5 |

Note.—NA = not applicable.
* Three of 18 patients were excluded because no injury was found in one and data were incomplete in two.
† One of 13 patients was excluded because no injury was found. If data for two additional patients, with intervals of 7 and 8 days, are excluded, this average interval is 1.5 days.
‡ Data were available for only eight of the 12 patients. If data for one additional patient, with an interval of 25 days, are excluded, this average interval is 7.3 days.

- 18 pts (58%) were treated surgically with DHS and 13 pts (42%) were treated conservatively
- mean time from injury to walking was only 2 days less in the surgical group
- follow-up involved only 12 pts, but there was no significant difference in the functional status between the 2 groups at follow-up

Shultz E, et al. *Radiology* 1999; 211: 237-240



THE JOURNAL OF BONE & JOINT SURGERY (BJ)

# The MRI diagnosis and management of incomplete intertrochanteric fractures of the femur

A. Alam,
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S. Ostlere

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**Incomplete intertrochanteric fractures do not extend across to the medial femoral cortex and are stable, without rotational deformity or shortening of the lower limb. The aim of our study was to establish whether they can be successfully managed conservatively. A total of 68 patients over a five-year period presented with a suspected fracture of the femoral neck and underwent an MRI scan for further assessment. From these, we retrospectively reviewed eight patients with normal plain radiographs but with an incomplete, intertrochanteric fracture on MRI scan. Five were managed conservatively and three operatively.**

**The mean length of hospital stay was 16 days for the conservatively-treated group and 15 days for those who underwent surgery; this was not statistically significant ($p > 0.5$) and all patients were mobilised on discharge. Although five patients were readmitted at a mean of 3.2 years after discharge, none had progressed to a complete fracture. We believe that patients with incomplete intertrochanteric fractures should be considered for conservative treatment.**

- 68 pts over 5 yr period who underwent MR for further assessment to diagnose or exclude a fx
- 8 pts (5 M and 3 F) with an incomplete, intertrochanteric fracture diagnosis by MR
- 3 pts (mean age of 61 yrs) were managed with DHS and 5 pts (mean age of 73.4 yrs) were managed conservatively
- mean length of hospital stay in conservatively treated group was 16 days and 15 days for those treated with surgery
- all pts were mobilized with support at discharge
- no pt from the conservatively treated group was readmitted for a complete fracture

# Intertrochanteric Femoral Fractures

- extracapsular, more robust blood supply, & much less likely to result in AVN or nonunion
- in describing should note
  - extent, including involvement of calcar, greater and lesser trochanters, and subtrochanteric region
  - presence or absence of comminution
  - displacement
  - reverse obliquity pattern

# Evans-Jensen Classification System

Type 1

Type 2

Type 3

Type 4

Type 5

reverse obliquity

Sheehan SE, et al. *Radiographics* 2015; 35: 1563-1584

# Incomplete Intertrochanteric Fractures

- included in Tronzo (1974) classification of intertrochanteric fractures but not included in other classification systems
- fracture that emanates from greater trochanter and extends into the intertrochanteric region without disruption of the medial cortex
- greater trochanteric portion is often detected but distal extent is often underestimated on initial radiographs
- early accurate diagnosis is critical, since isolated greater trochanteric fractures can be treated conservatively, but incomplete intertrochanteric fractures may require surgery
- MRI is more accurate than CT or bone scintigraphy in detecting whether greater trochanteric fractures have occult intertrochanteric of cervical extension

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