

# Imaging of hip trauma

## Occult, suspect and concomitant fractures

### Akademisk avhandling

Som för avläggande av medicine doktorsexamen vid Sahlgrenska akademien, Göteborgs universitet, kommer att offentligen försvaras i Hjärtats aula, Vita stråket 12, Sahlgrenska sjukhuset, Göteborg, onsdagen den 20 april 2016, kl 09.00

av  
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- I. Collin D, Dunker D, Göthlin J.H, Geijer M. **Observer variation for radiography, computed tomography, and magnetic resonance imaging of occult hip fractures.** Acta Radiol. 2011 Oct 1;52(8):871-4.
- II. Collin D, Göthlin J.H, Nilsson M, Hellström M, Geijer M. **Added value of interpreter experience in occult and suspect hip fractures: a retrospective analysis of 254 patients.** Emerg Radiol. 2016 Feb 25. [Epub ahead of print].
- III. Collin D, Geijer M, Göthlin J.H. **Computed tomography compared to magnetic resonance imaging in occult or suspect hip fractures. A retrospective study in 44 patients.** Eur Radiol. 2016 Jan 8. [Epub ahead of print].
- IV. Collin D, Geijer M, Göthlin J.H. **Prevalence of exclusively and concomitant pelvic fractures at magnetic resonance imaging of suspect and occult hip fractures.** Emerg Radiol. 2016 Feb;23(1):17-21.



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### ABSTRACT

**Background:** Between one and nine percent of all hip fractures are occult or suspect and further examinations with computed tomography (CT) and/or magnetic resonance imaging (MRI) are vital for further handling. Statistically robust conclusions have not been previously reported. **Aims:** To evaluate the extent to which the observer agreement (*reliability*) differ between different modalities and different observers; if high reliability for CT in selected cases reflect the actual fracture status (*accuracy*); if occult and suspect fractures are different entities and if experience influences the diagnostics; if exclusively pelvic fractures after low-energy trauma to the hip frequently occur and to what extent concomitant hip and pelvic fractures co-exist. **Methods:** Patients with normal or suspect radiographs and with subsequent examination with CT and/or MRI were reviewed and scored by four observers with varying radiological experience. Statistical analyses were performed with linear weighted kappa ( $\kappa$ ) statistics and chi-square tests. **Results:** Observer agreements for all interpreters were high for CT and MRI but the accuracy for CT was inferior to MRI – in selected cases. There was a higher rate of fractures among suspect than among occult cases, both at review of radiography and at MRI. At MRI there were frequent findings of concomitant hip and pelvic fractures and of exclusively pelvic fractures. **Conclusions:** Occult and suspect fractures are different entities. Experience improves the diagnostic performance for both radiography and CT but is of less importance for fracture diagnosis with MRI. The reliability of CT for an experienced reviewer is high but does not necessarily correlate with high accuracy in selected cases. Exclusively pelvic fractures at MRI are common after hip trauma. Hip and pelvic fractures are not mutually exclusive.

**Keywords:** Hip fractures, Occult, Pelvic, Radiography, Computed tomography, Magnetic resonance imaging, Observer variation

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