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Original article

John Thomas sign – a memorable but misleading sign in hip fractures[☆]



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ABSTRACT

Objective: The John Thomas sign is a favourite of medical students and theorizes that in femoral neck fractures, the male member will lie to the side of the fracture on the plain radiograph. The aim of this study was to evaluate the accuracy, and examine the phenomenon of eponymous signs. We sought to answer the following questions: (1) How accurate is the sign in the context of a consecutive series of male patients with hip fractures? (2) Is there a relationship between side and size of penile lie and the side of fracture?

Hypothesis: That the accuracy of the John Thomas sign is, like many eponymous signs, spurious.

Materials and methods: Two hundred male AP pelvis radiographs were examined, of which 100 had a hip fracture and compared these against 100 control films that did not. Age at presentation, and the side, length and angle of penile lie were measured.

Results: The results show two findings: that the accuracy of the supposed “sign” is less accurate than the toss of a coin; and that left lie and left-sided fractures are more common. We fail to show a relationship between side of fracture, John Thomas size or degree of angulation.

Conclusion: John Thomas sign is no better than the toss of a coin in relation to hip fractures, and is not related to side of fracture, or penile attitude. We propose that the side of lie observed in male fractures may be as a result of handedness or natural underlying body asymmetry rather than as a result of the fracture.

Level of evidence: Level III Case control study.

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1. Introduction

The definitive diagnosis of traumatic fracture most often begins and ends with radiography of the hip and pelvis. Conventional radiography of the pelvis is inexpensive and accurate diagnostic tool, typically with antero-posterior and lateral views of the affected hip. Sensitivity is 90–98%, however, this implies a significant false negative rate [1]. The gold standard for diagnostic imaging is the relatively expensive MRI in which the sensitivity can approach 100% [2].

Gross displacement of the femoral head can be easily distinguished with plain radiography, but a cortical breach or radiolucent line is not always discernible [2]. A less-well described radiographic sign in the medical literature is the John Thomas sign. This sign, a favourite of medical students, states that in the setting of a hip fracture in a male patient the penis will tend to lie or “point to” the side of the fracture. The authors noted with interest that many medical students, when evaluating a patient following a fall, tended to comment on the presence of the eponymous sign before seeking radiographic evidence of a hip fracture.

Our hypothesis for this study was that the accuracy of the John Thomas sign is poor, and we sought to answer the following questions:

- how accurate is the sign in the context of a consecutive series of male patients with hip fractures?
- is there a relationship between side and size of penile lie and the side of fracture?
- how do our findings compare with those published in the literature in different medical cultures, and question what other factors, apart from its humorous and slightly lewd nature, may be implicated?

[☆] The subject of the following article is, to say the least, unusual, but the Editorial Board has decided to make room for it nonetheless. It can be read humoristically, as tongue-in-cheek or an April Fool's Day spoof. Or it can be seen as a high-quality methodological approach to a topic of no real interest, raising a genuine question: is the methodological quality of a study enough to merit its publication? In the present case, the answer pretty clearly seems to be No! We are including it all the same – perhaps just to stimulate reflection on the part of editors, reviewers and authors as to the experimental or clinical relevance of the studies we wish to publish.

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2. Material and methods

2.1. Patients

A search inquiry for the hospital radiology information system was used to find patients that had been investigated for hip fracture between August 2009 to December 2011. One hundred consecutive male patients with femoral neck and inter-trochanteric fractures were included. Fractures of the acetabulum and pubic ramus fractures were excluded. One hundred consecutive male trauma cases whose radiographs did not show fractures were included as controls. Only departmental AP radiographs were considered.

2.2. Method of assessment

The age of the patient, and the side and site of the fracture were recorded. All records were retrospective and anonymised. The side to which the penis was lying on antero-posterior radiograph was noted as “left”, “right”, or if the penis was collinear with the cranio-caudal axis (i.e. pointed due south), was noted as “neutral”. The length of the penis on the radiograph was measured from inferior aspect of the pubic symphysis to the tip, and the angle between the long axis of the penis and a cranio-caudal line (through the pubic symphysis) was also measured (Fig. 1a, b) to analyze if size or angulation had any bearing on side of fracture. A database was compiled for statistical analysis.

2.3. Statistics

All statistical analyses were carried out using Minitab 15 (Minitab Inc., Coventry, UK, 2009). Mean differences in the size and angle of penile lie between the fracture and non-fracture groups were tested using Anova. Non-parametric data for “side of lie” was allocated a -1 for “left”, 0 for “neutral” and +1 for “right”. Relationships between positive or negative John Thomas sign and both penile length and angle of penile lie were examined using the Kruskal-Wallis test. To test whether a difference existed in the proportion of left-sidedness of lie in the fracture versus non-fracture group, a chi² analysis was conducted. Data was considered statistically significant when $P < 0.05$.

3. Results

Age, side and of lie, degree of angulation and size are summarized in Table 1.

Overall, the accuracy of the John Thomas sign was 46%, i.e. the sign was positive in 46 cases, neutral in 11 and negative in 43 cases (Table 2).

There was no significant difference between side of fracture and penile size ($P = 0.78$) or side of fracture and angulation ($P = 0.44$) (Tables 1 and 2). No relationship existed between the John Thomas

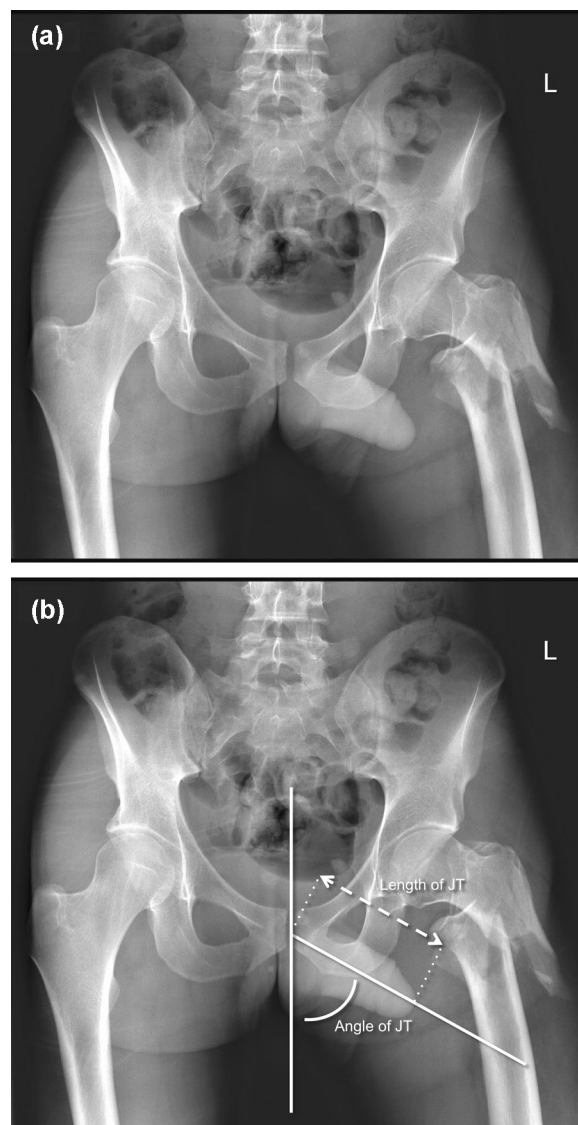


Fig. 1. (a) AP radiograph of fracture of left proximal femur (b) with overlying measurements of length and angulation.

positive and John Thomas negative groups for either size ($P = 0.291$), or angle of lie ($P = 0.119$) (Tables 1 and 2). While left-sided lie was more common for both groups, there was no statistically significant difference in the proportion of left-sidedness in the fracture and non-fracture groups ($P = 0.161$) (Table 1).

4. Discussion

The John Thomas sign is one of many eponymous signs in medicine more famous for being famous than for their scientific rigueur. The primary hypothesis forwarded for its supposed accuracy is thought to be positional; that displaced hip fractures lead to

Table 1
Table showing mean age, JT side of lie, angle and size.

		Fracture group	Non-fracture group
Mean age		77years	73 years
JT lie	Left-sided	56	75
	Neutral	11	8
	Right sided	33	17
JT angle		33.2 degree	32.1 degree
		Range 0–123 degree	Range 0–97 degree
JT size		10.8 cm	10.9 cm
		Range 6–18 cm	Range 5–19 cm

JT: John Thomas.

Table 2
Fracture group, JT sign status, size and angle.

	Total	Average JT size (cm)	Average JT angle (deg)
JT sign positive	46	10.98	30.5
JT sign negative	43	11.48	34.9
JT sign neutral	11	9.81	<5

JT: John Thomas.

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