

Case Report

Literature review and case report: Current concepts for concomitant intra and extracapsular fractures of neck of femur in elderly patients

SaleebH^{a,*}, KanvindeR^b, RahmanT^c^a Orthopaedic Registrar, Betsi Cadwaladr University Health Board, United Kingdom^b Consultant Orthopaedic Surgeon, Betsi Cadwaladr University Health Board, United Kingdom^c Orthopaedic SHO, Betsi Cadwaladr University Health Board, United Kingdom

ARTICLE INFO

Article history:

Accepted 2 January 2017

Available online 27 February 2017

Keywords:

Concomitant/simultaneous intracapsular/
extracapsular fractures

Fracture fixation

Hip fractures/complications

Hip fractures/radiography

Ipsilateral hip fractures/surgery

Hip joint/surgery

Hip fracture neck of femur fracture segmental

fracture hemiarthroplasty dynamic hip

fixation

ABSTRACT

Though the incidence of concomitant ipsilateral intracapsular and extracapsular fracture neck of femur is still a rare presentation in day to day fracture hip admissions. Cases of simultaneous ipsilateral intra- and extra-capsular neck of femur fractures are forestalled with problems relating to diagnosing this injury as well as debate regarding optimal methods of fixation versus arthroplasty. We did a literature review to assess frequency of such fracture incidence, high-light methods of treatment applied, current practice for management as well as case report presentation.

Crown Copyright © 2017 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

In the field of orthopaedics, hip fractures are a common occurrence, be they are a result of an elderly falling in her home or a substantially younger individual crawling away from the scene of a bad road traffic accident. Hip fractures have, for a long time, been classified broadly into intracapsular and extracapsular subtypes, so it is a rarity when a patient is admitted to hospital presenting with a simultaneous intra and extracapsular type of hip fracture. We are presenting a challenging case with literature review of similar cases and their management.

There are only limited case reports of a simultaneous intra- and extra-capsular fracture of the hip throughout the literature. Most of cases reported were due either misplacement of DHS or 2ry subcapital fracture.

Most cases have occurred following low energy falls in elderly osteoporotic patients with the exception of a few cases following road traffic accidents [5,6].

Methods of fixation vary between cases. DHS fixation is the most common means of fixation adopted in multiple cases (seven cases), four of which used supplementary anti-rotation devices. One patient underwent fixation with a long stem hemiarthroplasty and Parham bands [6]. In our case total hip replacement with constrained cup was chosen by the treating surgeon.

* Corresponding author.

E-mail address: mr.hany.saleeb@gmail.com (H. Saleeb).

Case presentation

History

The patient in question was an 88-year-old lady of unpleasantly confused disposition (due to cognitive impairment) found on the floor of her nursing home after having tripped over a mat and thenceforth being unable to mobilize and complaining of pain in her right hip (Fig. 1).

Clinical examination

On clinical examination she had a tender right hip with a shortened and externally rotated leg.

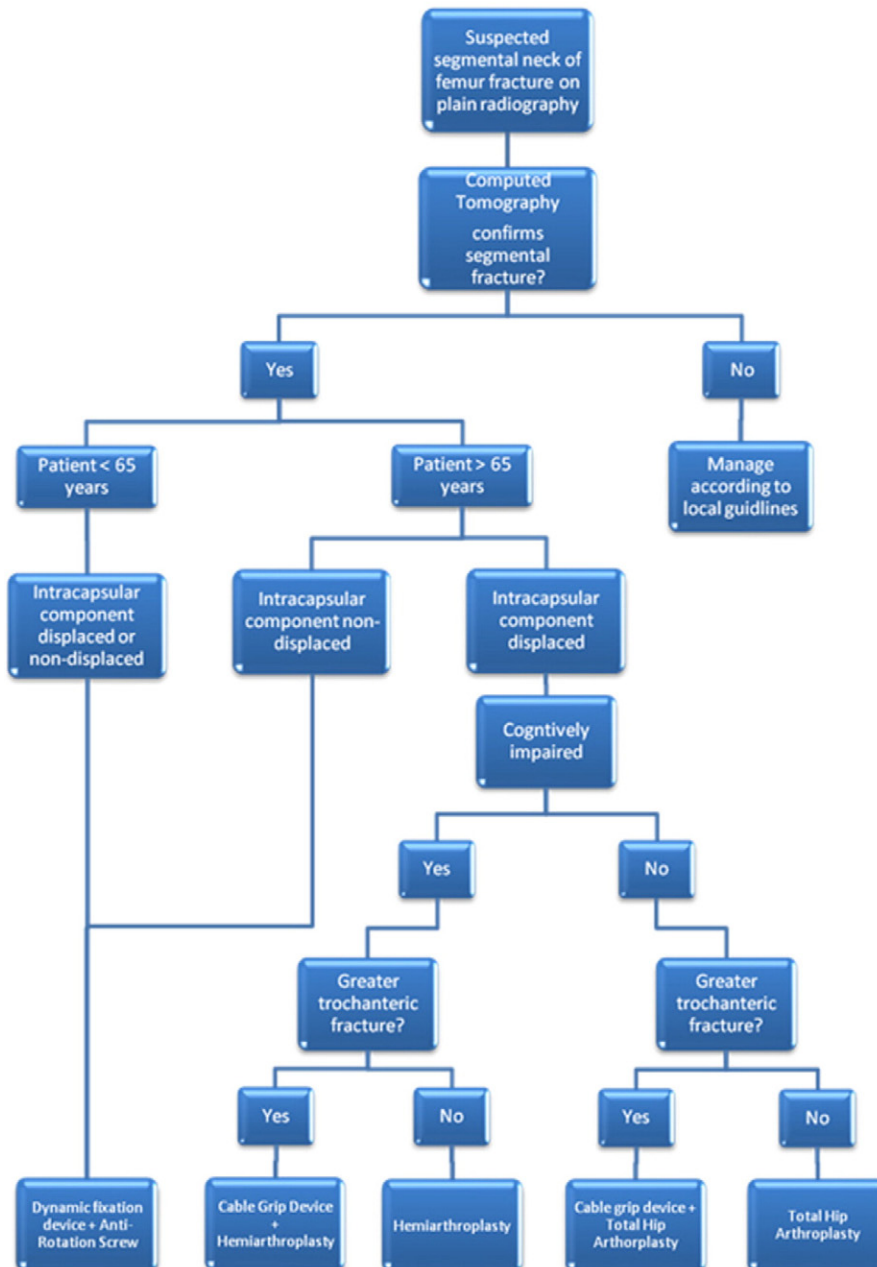


Fig. 1. Algorithm for the management of segmental neck of femur fractures.



Fig. 2. Initial AP X-ray on admission.

Investigations

The initial X-rays of her affected hip (Figs. 2, 3) could not confirm a definitive fracture so a CT was requested which reported “an impacted fracture of the right neck of femur extending from the subcapital region anteriorly to the intertrochanteric region posteriorly”, raising the question of whether or not one segment of the fracture (possibly the intracapsular part) had actually preexisted, escaping prior diagnosis (Figs. 4–8).

Management plan

The operative management for this patient was a choice between a hemiarthroplasty and a total hip replacement. Due to the uncommon nature of the fracture with the intertrochanteric element making the risk of dislocation higher, it was decided to treat this case with a cemented collarless total hip replacement (Tables 1–2).

Post operatively, she was initially unstable, scoring a NEWS ranging 8–9 that was mainly a side effect of her cognitive impairment and agitation, which had her desaturating on air enough to require oxygen, only to pull off the oxygen mask as soon as the nursing staff managed to put one on.



Fig. 3. Initial lateral view.

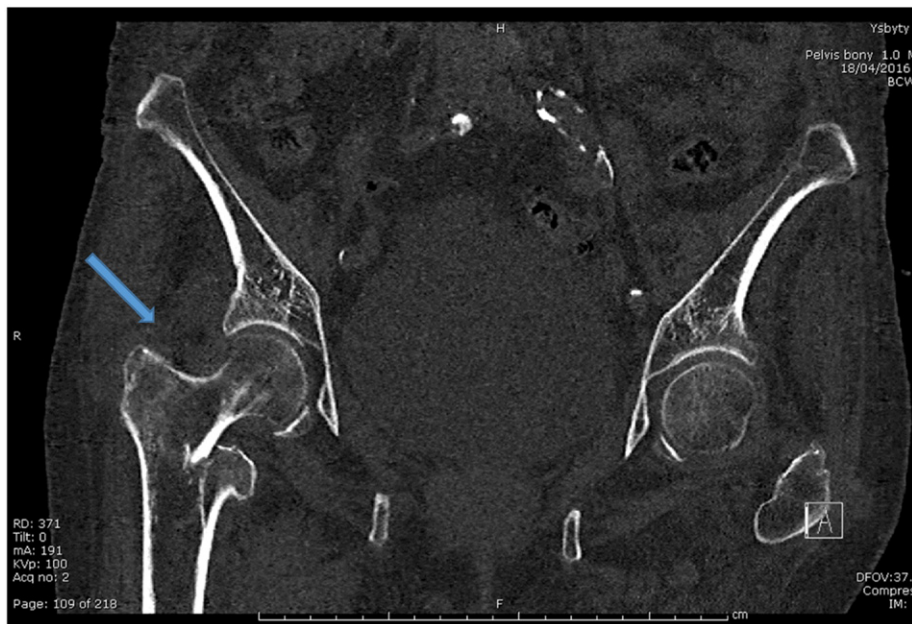


Fig. 4. CT scan images showing intracapsular and extracapsular fracture neck of femur.

Even though physiotherapy wasn't entirely feasible in light of her mental status, she recovered reasonably well, all things considered, and after a few weeks was eagerly attempting to get out of bed in her quest for a restroom.

Unfortunately, she was readmitted shortly after being discharged to her nursing home, a few days following a fall, only to contract a dislocation of her THR. Her hip was successfully relocated under anaesthesia and she went back to her nursing home the day after.

We searched the literature for similar cases and methods of fixation or implant used, mechanism of injury, follow up and outcome if available.

Methods

We conducted the following database search AMED (Allied and Complementary Medicine) 1985 to May 2016, Database Field Guide Embase 1974 to 2016 May 26, Database Field Guide HMIC Health Management Information Consortium 1979 to March



Fig. 5. CT scan images showing intracapsular and extracapsular fracture neck of femur.

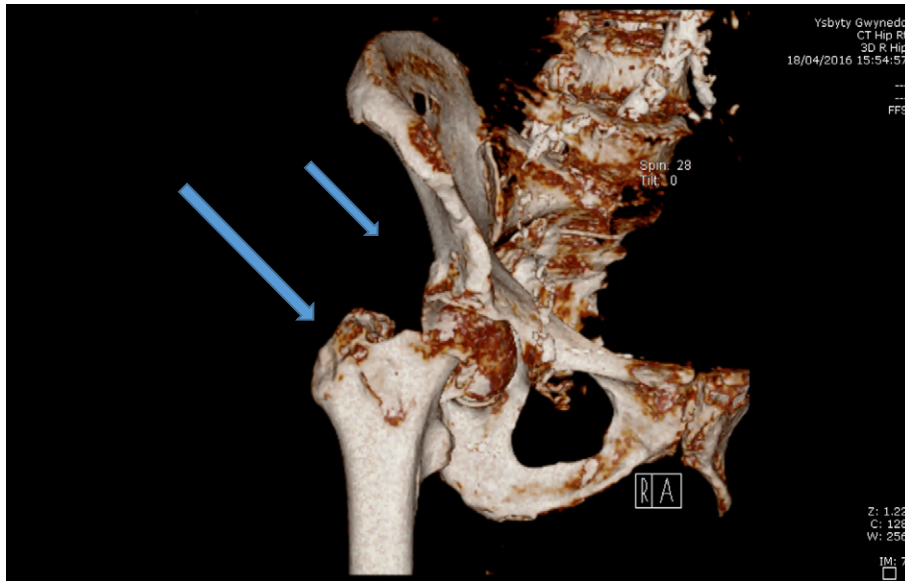


Fig. 6. 3-D CT scan images showing intracapsular and extracapsular fracture neck of femur.

2016, Database Field Guide PsycINFO 1806 to May Week 4 2016, Database Field Guide Books@Ovid May 23, 2016, Database Field Guide Ovid Journals Database, Database Field Guide NHS Wales Full Text Journals, Database Field Guide Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Ovid MEDLINE(R) Daily and Ovid MEDLINE(R) 1946 to present.

The following keywords were used in the searches: intracapsular neck of femur fracture or extracapsular neck of femur fracture or these terms were connected by the Boolean operators “AND” and “OR”. Additionally, the reference lists of included articles and relevant reviews were also examined for potential studies. No language restriction was applied.

Results

We identified in our search 16 cases of similar incidence over the past 27 years. The incidence of such fracture is more common in females (9 females) 56% with average age around 62 years in our literature review.

Concomitant intra and extracapsular fractures of neck of femur occurred in a bimodal age distribution and this is directly related to the injury mechanism. Incidence peaks in the mid-30s in high energy trauma, and mid-60s in low energy trauma.

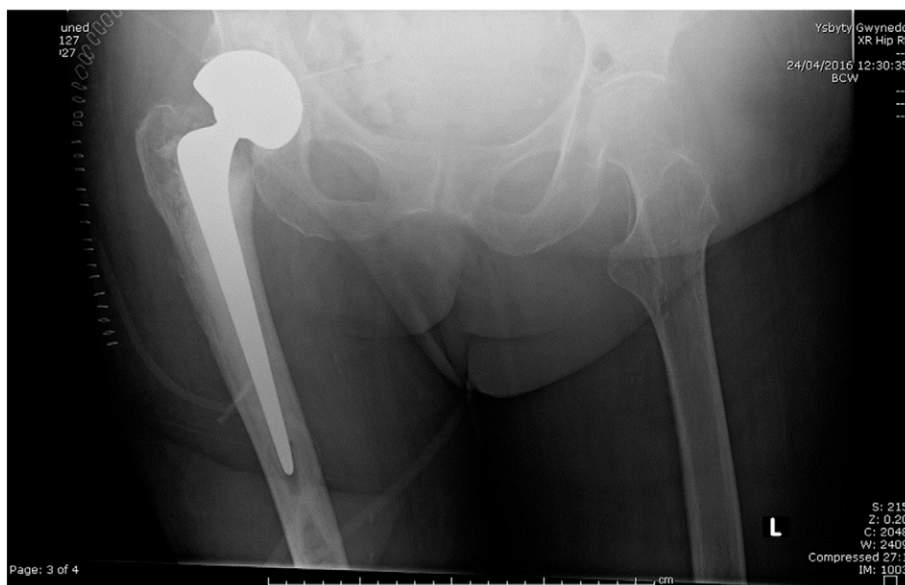


Fig. 7. postoperative X-ray following THR.



Fig. 8. X-ray showing dislocation of the THR.

Table 1

The results of our search are summarized in the table below showing limited cases of similar incidence in last quarter of a century.

Author/year	Age	Sex	Mechanism	Fracture type	Pre-op imaging	Implant used	Follow-up (months)	Outcome
Cooke, R F 1989 [1]	73	F	Fall	Subcapital + basicervical	X-ray	DHS	30	Good
An 1989	NA	NA	Fall	Intertrochanteric + neck	X-ray	Hemiarthroplasty with Parham bands Pinning	NA	Good
Lawrence 1993 [2]	Elderly	NA	Fall	Intertrochanteric + subcapital	X-ray		2	Death-unrelated
Cohen 1999 [3]	79	F	Fall	Peritrochanteric + subcapital	X-ray	DHS	24	Good
Yuzo 2001 [4]	89	F	Fall	Neck + trochanter	X-ray, CT, MRI	Bipolar hemiarthroplasty	NA	Good
Poul 2001 [5]	83	F	Fall	Intertrochanteric + subcapital	X-ray	DHS + TSP + ARS	12	AVN
Lakshmanan 2005 [6]	91	F	Fall	Subcapital with extracapsular extension	X-ray	Hemiarthroplasty	6	Good
Sayegh 2005 [7]	54	M	Crush injury (olive press)	Intertrochanteric + subcapital	X-ray	DHS and cerclage	58	Good
Poulter 2007 [8]	76	F	Fall	Intertrochanteric + subcapital	X-ray	PCCP	4	Good
Butt 2007 [9]	30	M	RTA	Neck + reverse oblique	X-ray	DHS + ARS	12	Good
Perry 2008 [10]	86	F	Fall	Intertrochanteric + neck	X-ray	DHS	3	AVN
Dhar 2008 [10]	30	M	RTA	T shape NOF	X-ray	DCP + lag screws	12	Good
Loupasis 2010 [11]	36	M	RTA	Intertrochanteric + subcapital	X-ray	DHS + ARS	24	Good
Raviraj 2011 [12]	38	M	RTA	Neck and peritrochanteric	X-ray, CT	DCS + ARS	28	Good
Muzaffar 2011 [13]	Mid-age	F	RTA	Transcervical, trochanter + shaft	X-ray	NA	NA	Death-polytrauma
Tahir 2014 [14]	87	F	Fall	Ipsilateral subcapital, greater trochanteric and intertrochanteric fracture	X-ray, CT	Bipolar hemiarthroplasty and proximal femur plate fixation	3	Good

Concomitant intra and extracapsular neck of femur fractures reported in the literature (THR: total hip replacement; Hemi: hemiarthroplasty; PCCP: Percutaneous Compression Plating; DHS: dynamic hip screw; ARS: anti-rotation screw; DCP: Dynamic Compression Plate; TSP: Trochanter Stabilizing Plate; DCS: Dynamic Condylar Screw NA: not available; NR: not recorded).

Table 2

Statistical analysis of data in Table 1.

Statistics				Gender	Age
N		Valid		14	13
		Missing		2	3
Age					
Mean			N		Std. Deviation
62.8462			13		28.97944
Age					
Gender		Mean		N	Std. Deviation
Male		63.8000		5	28.70888
Female		70.7143		7	21.45316
Total		67.8333		12	23.73656
Gender					
		Frequency	Percent	Valid percent	Cumulative percent
Valid	m	5	31.3	35.7	35.7
	f	9	56.3	64.3	100.0
	Total	14	87.5	100.0	
Missing	System	2	12.5		
Total		16	100.0		

Dynamic hip screw was used in 6 cases (43%) as a mean of fixation versus 25% for hemiarthroplasty. Antirotation screws were used in 4 cases whilst trochanteric stabilizing plate was applied in one case

The advantages of internal fixation compared with arthroplasty are: it allows the patient to retain his or her own femoral head with less surgical trauma compared with arthroplasty. Mortality and morbidity may be marginally reduced in very frail patients with reduced risk of sepsis and complications of wound healing.

Randomised trials and review articles have reported a lower rate of re-operation and tendency to better functional outcomes in elderly patients undergoing arthroplasty compared with internal fixation [13–15]. No difference in mortality has been shown between the two procedures [16].

X-rays are usually the initial investigation needed but resorting to CT scans may reveal concomitant subtle fractures that may not appear obviously on x ray as in our case and this might change the management plan as well as the team embarking on the plan according to experience especially if THR is planned in the course of management. Tahir et al. in 2014 [17] proposed an Algorithm for the management of segmental neck fractures.

Conclusions

Our results would recommend tailoring surgical plan according to the patient age, functional mobility, expectations and displacement of intracapsular component. When approaching concomitant intra and extracapsular fractures of neck of femur, the objectives are to provide a stable construct whilst preserving the femoral head where possible. Typically, in intracapsular fractures of the femoral head, younger patients undergo dynamic hip screw (DHS) fixation to preserve the femoral head, whereas elderly patients undergo hemiarthroplasty or THR due to the risk of AVN in what for many patients will be definitive surgery. The choice between hemiarthroplasty and total hip replacement is still a matter of debate taking in the consideration the fracture pattern, level of mobility, cognitive impairment as well as surgeon experience when approaching such age group.

References

- [1] R.F. Cooke, R. Limbird, W.T. Jackson, Simultaneous ipsilateral intertrochanteric and subcapital fracture of the hip. A case report, *Orthopedics* 12 (5) (1989) 721–723.
- [2] C. Isaacs, B. Lawrence, Concomitant ipsilateral intertrochanteric and subcapital fracture of the hip, *J. Orthop. Trauma* 7 (2) (1993) 146–148 (Available from: <http://www.embase.com/search/results?subaction=viewrecord&from=export&id=L23880248/nhttp://findit.library.jhu.edu/resolve?sid=EMBASE&issn=08905339&id=doi:&title=Concomitant+ipsilateral+intertrochanteric+and+subcapital+fracture+of+the+hip.&title=J+Orthop+Internet>).
- [3] I. Cohen, V. Rzetelny, Simultaneous ipsilateral pertrochanteric and subcapital fractures, *Orthopedics* 22 (5) (1999) 535–536.
- [4] Y. Oda, M. Yamanaka, H. Tada, N. Isaka, A case of femoral neck and trochanteric fracture in ipsilateral femur, *Orthop. Traumatol.* 50 (4) (2001) 1072–1075.
- [5] J. Poul, M. Vejrostopova, Rotational acetabular osteotomy in the treatment of Legg-Calve-Perthes disease, *Acta Chir. Orthop. Traumatol. Cechoslov.* 68 (6) (2001) 357–362.
- [6] P. Lakshmanan, J.P. Peehal, Management of an unusual intra- and extra-capsular subcapital femoral neck fracture, *Acta Orthop. Belg.* 71 (5) (2005) 622–625.
- [7] F.E. Sayegh, D. Karataglis, S.J. Trapotsis, J.E. Christoforides, J.D. Pournaras, Concomitant ipsilateral pertrochanteric and subcapital fracture of the proximal femur, *Eur. J. Trauma* 31 (1) (2005) 64–67.
- [8] R.J. Poulter, M.J. Ashworth, Concomitant ipsilateral subcapital and intertrochanteric fractures of the femur, *Inj. Extra.* 38 (3) (2007) 88–89.
- [9] Femoral neck fracture with ipsilateral trochanteric fracture: is there room for osteosynthesis? *J. Orthop. Surg.* 5 (1) (2007) (Internet).
- [10] D.C. Perry, S.J. Scott, Concomitant ipsilateral intracapsular and extracapsular femoral neck fracture: a case report, *J. Med. Case Rep.* 2 (2008) 68.
- [11] G. Loupasis, P.G. Ntagiopoulos, A. Asimakopoulos, Concomitant ipsilateral subcapital and intertrochanteric fractures of the femur: a case report, *J. Med. Case Rep.* 4 (2010) 363.
- [12] A. Raviraj, A. Anand, Ipsilateral femoral neck and trochanter fracture, *Indian J. Orthop.* 45 (3) (2011) 284.

- [14] S. Lakkol, S. Naique, Segmental neck of femur fractures: a unique case report of an ipsilateral subcapital, greater trochanteric and intertrochanteric fracture and proposed management algorithm, *Int. J. Surg. Case Rep.* [Internet], 5(5), Elsevier Jun 26, 2016, pp. 277–281 Available from: 10.1016/j.ijscr.2014.03.012.
- [15] H. Zhang, J. Chen, F. Chen, W. Que, The effect of tranexamic acid on blood loss and use of blood products in total knee arthroplasty: a meta-analysis, *Knee Surg. Sports Traumatol. Arthrosc.* 20 (9) (2012) 1742–1752.
- [16] A. Sebestyen, I. Boncz, F. Toth, M. Pentek, J. Nyarady, J. Sandor, Correlation between risk factors and mortality in elderly patients with femoral neck fracture with 5-year follow-up, *Orv. Hetil.* 149 (11) (2008) 493–503.
- [17] M. Tahir, S. Lakkol, S. Naique, Segmental neck of femur fractures: a unique case report of an ipsilateral subcapital, greater trochanteric and intertrochanteric fracture and proposed management algorithm, *Int. J. Surg. Case Rep.* 5 (5) (2014) 277–281.