Zhou *et al. BMC Musculoskeletal Disorders* (2024) 25:988
https://doi.org/10.1186/s12891-024-08105-6

BMC Musculoskeletal Disorders

RESEARCH

Open Access

Are all cases of floating hip the same? Further understanding of floating hip

Xiaofeng Zhou[1], Yu Liu[1,2], Ajuan Zhang[3], Chenglong Wang[4], Xuehui Zhao[4], Jinlei Dong[4], Fanxiao Liu[4], Weicheng Xu[4], Fan Feng[1], Lianxin Li[1,4*] and Shun Lu[4*]

Abstract

Purpose Floating hip is a severe high-energy injury. Femoral fracture is an essential component of floating hip. However, few studies have addressed the relationship between the femoral fracture pattern and floating hip injury. In this study, we reviewed and summarized the epidemiological and clinical data of patients with floating hip.

Patients and methods We retrospectively reviewed patients with a diagnosis of floating hip at our trauma center from January 2014 to December 2021. Data on patient demographics, characteristics of the injuries, associated injuries, whether sciatic nerve palsy (SNP) occurred, the number of operations performed, and the total length of hospital stay were analyzed.

Results A total of 76 patients met the diagnostic criteria for floating hip, 45 of whom had proximal femoral fractures. The mean Injury Severity Scores in patients with proximal and non-proximal femoral fractures were 21.47 ± 10.67 and 17.61 ± 7.64, respectively, and the mean Abbreviated Injury Scale scores were 13.31 ± 9.71 and 9.52 ± 4.32, respectively. Motor vehicle collision and a fall from a height were the main causes of injury. Chest injury was the most common associated injury. Twenty-two patients were diagnosed with SNP, 17 of whom had a proximal femoral fracture. Of the patients with pelvic fractures, 15 were diagnosed with SNP, 14 of whom also had a proximal femoral fracture. Of the patients with acetabular fractures, seven were diagnosed with SNP, three of whom also had a proximal femoral fracture.

Conclusion More than half of patients with floating hips have a combined proximal femoral fracture. In this study, fracture of the pelvis or acetabulum combined with a proximal femoral fracture had a higher AIS score and higher risk of SNP than fracture of the pelvis or acetabulum combined with a non-proximal femoral fracture. Patients with a single pelvic fracture showed similar results, but patients with a single acetabular fracture did not. A pelvic or acetabular fracture combined with a proximal femoral fracture has a different outcome than a mid-distal femoral fracture, which may be a "true" floating hip.

Keywords Floating hip, Pelvic fracture, Acetabular fracture, Combined fracture

*Correspondence:
Lianxin Li
lilianxin@hotmail.com
Shun Lu
sdqdpdlushun@163.com
[1]Department of Orthopaedics Surgery, Shandong Provincial Hospital, Shandong University, Jinan, People's Republic of China
[2]Department of Orthopedics, Jinan Central Hospital Affiliated to Shandong First Medical University, Jinan, People's Republic of China
[3]Department of Intensive Care Unit, Qingdao Hiser Hospital Affiliated of Qingdao University (Qingdao Traditional Chinese Medicine Hospital), Qingdao, People's Republic of China
[4]Department of Orthopaedics Surgery, Shandong Provincial Hospital affiliated to Shandong First Medical University, Jinan, People's Republic of China

Introduction

The combination of pelvic ring or acetabular fractures and ipsilateral femoral fractures is rare and usually results from high-energy trauma [1, 2]. The reported incidence of such injuries is approximately 1 in 10,000 [2, 3]. This type of injury was first described in a case report in 1980 [4]. In 1992, Liebergall et al. [3] described 17 patients with ipsilateral femoral fractures associated with acetabular or pelvic fractures and termed this condition "floating hip." Floating hip was later divided into two types: Type A, characterized by ipsilateral pelvic and femoral fractures, and Type B, characterized by ipsilateral acetabular and femoral fractures [5]. Müller et al. [6] and Brioschi et al. [7] later modified and proposed a third classification of femoral fractures combined with ipsilateral pelvic and acetabular fractures.

Most floating hips are associated with complications such as deep venous thrombosis, avascular necrosis, and sciatic nerve palsy (SNP) [5, 8]. Cech et al. [5] found that type C floating hip had a higher risk of bleeding. Burd et al. [9] reported that the incidence of SNP was associated with the absence or presence of true discontinuity of the pelvis in patients with floating hips. Brioschi et al. [7] found that complications were related to the instability and severity of pelvic and acetabular fractures and that the types of femoral fractures had a certain relationship with the Young–Burgess pathomechanism. In traditional studies of floating hip, there are relatively few reports of vascular and nerve damage.

In the current study, a pelvic fracture or acetabular fracture combined with an ipsilateral femoral fracture is collectively referred to as floating hip. However, some scholars have indicated that broadly defining this type of injury as floating hip is inappropriate [6]. In contrast to floating knees and floating elbows, for example, floating hip is often associated with a high risk of adjacent vascular and nerve injury [6, 10]. Liebergall et al. [11] reported that most surgeons only define type B as a "true" floating hip injury. Müller et al. [6] proposed that ipsilateral pelvic or acetabular and femoral fractures should not be considered a specific fracture combination. Some scholars have also published papers on such injuries without using the term "floating hip" to describe this injury [8, 12, 13]. "Floating" injuries frequently have a high risk of injury to nerves and vessels, but previous studies have only classified the pelvic side of the injury in detail, neglecting the description of the femoral side [14, 15]. Although fractures of the proximal, middle, and distal femur have been studied together, few studies have focused on the relationship between femoral fracture patterns and floating hip characteristics. Thus, previous findings may not reflect the true characteristics of floating hip injuries.

The present study focused on investigating the different fracture patterns and detailed associated with floating hip injuries and their clinical outcomes. We analyzed the epidemiological and clinical data of patients with this injury and summarized the types, characteristics, and influencing factors.

Materials and methods

This was an observational and retrospective study. The study was approved by the Human Ethics Committee of Shandong Provincial Hospital Affiliated to Shandong First Medical University, with approval number SWYX: NO.2022−193; Written informed consent was obtained from each study participants. Data on patients with a diagnosis of a pelvic or acetabular fracture from January 2014 to December 2021 were retrieved from the Shandong Provincial Hospital database, which was screened to select patients with floating hip injuries. Patients with insufficiency fractures were excluded. This study was approved by our institutional medical ethics committee and was performed in compliance with the Declaration of Helsinki. All patients provided informed consent (the parents or legal guardians of patients aged < 18 years signed the informed consent form), and all data were anonymized before the analysis to ensure patient privacy.

The following information was collected for each patient: age, sex, mechanism of injury, Injury Severity Score (ISS), Abbreviated Injury Scale (AIS) score, associated injuries, occurrence of SNP, units of packed red blood cells (PRBCs) transfused during the hospital stay, number of operations performed, and total length of hospital stay. Pelvic fractures were classified with the Tile classification [16], and acetabular fractures were classified with the Letournel–Judet classification [17]. Femoral fractures were classified into proximal and non-proximal fractures according to their anatomical location. Proximal fractures were divided into four types: femoral head, femoral neck, intertrochanteric, and subtrochanteric fractures. All fractures were classified by two experienced orthopedic surgeons in the trauma department.

Statistical analysis

All results were evaluated using SPSS 25.0 for Windows (IBM Corp., Armonk, NY, USA). Data that met the normality assumption (age, ISS, and AIS score) are presented as mean ± standard deviation and were compared with Student's *t* test. Data that were not normally distributed were compared with the non-parametric Mann–Whitney test. Differences in patient characteristics, such as sex, mechanism of injury, additional injuries, and nerve injury, were analyzed using Fisher's exact test and the chi-square test. A P-value of < 0.05 was considered statistically significant.

Table 1 General information

Characteristics	Average (± SD) or No. of Patients
Number of cases	76
Gender (male/female)	49/27
Mean age, years (range)	38.36(11–80)
Standard deviation (SD)	16.00
ISS	19.89 ± 9.69
AIS	12.12 ± 8.22
Mechanism of injury	
Fall from height	24
Motor vehicle collision	38
Fall from bicycle	6
Struck by falling objects	4
Mechanical crush injury	4
Additional injuries	
Head	17
Chest	28
Spine	27
Abdomen	13
Pelvic cavity	14
Upper extremity	22
Ipsilateral lower extremity	27
Contralateral lower extremity	5
Bilateral lower extremity	9

Abbreviations: SD, standard deviation; ISS, Injury Severity Score; AIS, Abbreviated Injury Scale

Results

General information

In total, 76 patients with complete radiographic and clinical data for evaluation were eligible for this study. The patients comprised 49 men and 27 women, and their mean age was 38.39 years. The mean ISS was 19.89±9.69, and the mean AIS score was 12.12±8.22. An associated injury occurred in 65 (85.6%) patients, and 47 (61.8%) patients had two or more additional injuries. Motor vehicle collision and a fall from a height were the most common causes of injury, affecting 83 (50.0%) and 24 (31.6%) patients, respectively. The most common associated injury was chest injury (n=28, 36.8%), followed by ipsilateral lower extremity and spinal injuries (n=27, 35.5%) (Table 1).

Classification of fractures

A pelvic fracture combined with an ipsilateral proximal femoral fracture was found in 33 patients, and an acetabular fracture combined with an ipsilateral proximal femoral fracture was found in 12 patients. Twenty-one patients had pelvic combined with ipsilateral non-proximal femoral fractures. Ten patients had acetabular combined with ipsilateral non-proximal femoral fractures.

The pelvic and acetabular fractures are classified in Fig. 1. The most common types of pelvic fracture were type C1 (n=10, 30.3%) and type A2 (n=9, 27.2%), and the most common type of acetabular fracture was posterior wall fracture (n=7, 58.3%). The proximal femoral fractures were classified by anatomy and location. Twenty patients had a femoral neck fracture, 13 had a subtrochanteric fracture, 7 had an intertrochanteric fracture, and 5 had a femoral head fracture (Fig. 1).

Comparison of patients according to Müeller classification system

Of the 76 patients, 54 were diagnosed with type A injury and 22 with type B. The mean ISSs in the two groups were 21.48±9.84 and 16.00±8.28, and the mean AIS scores were 13.00±8.10 and 9.95±8.29. SNP occurred

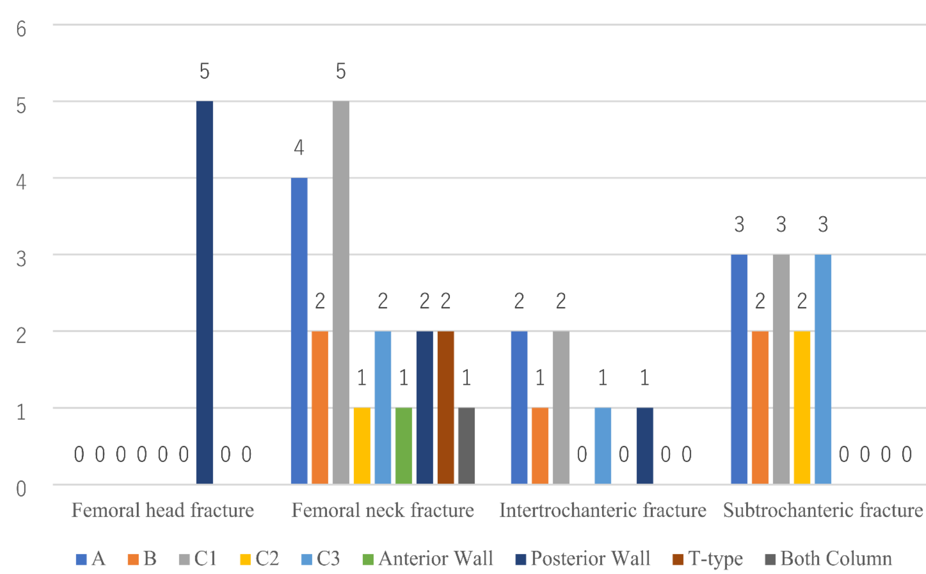

Fig. 1 Fracture classification

Table 2 Demographics of patients with Müeller Type A or B Injury

Characteristics	Pelvic Fracture (Type A)	Acetabular Fracture (Type B)	P-value
Number of cases	54	22	
Gender (male/female)	33/21	16/6	0.432
Mean age, years (range)	38.04(11–80)	39.14(17–63)	0.788
Standard deviation (SD)	17.10	13.26	
ISS	21.48 ± 9.84	16.00 ± 8.28	0.024*
AIS	13.00 ± 8.10	9.95 ± 8.29	0.144
PRBCs (units)	4.00(1.13, 6.00)	4.00(0.00, 4.50)	0.628
Operation frequency (times)	2.00(1.00, 4.00)	2.00(1.00, 3.00)	0.514
Hospital stay (days)	30.00(21.75, 52.50)	25.00(19.50, 33.25)	0.073
SNP	15	7	0.783
Thrombo-embolism	17	8	0.789

Abbreviations: SD, standard deviation; ISS, Injury Severity Score; AIS, Abbreviated Injury Scale; PRBCs, packed red blood cells; SNP, sciatic nerve palsy

Table 3 Demographics of patients with pelvic or acetabular fractures with proximal or non-proximal femoral fracture

Characteristics	Proximal femur fracture	Non-proximal femur fracture	P-value
Number of cases	45	31	
Gender (male/female)	30/15	19/12	0.630
Mean age, years (range)	39.89(11–80)	36.13(16–68)	0.317
Standard deviation (SD)	16.38	15.44	
ISS	21.47 ± 10.67	17.61 ± 7.64	0.071
AIS	13.31 ± 9.71	9.52 ± 4.32	0.009*
PRBCs (units)	4.00(0.00, 6.00)	4.00(2.00, 6.00)	0.426
Operation frequency (times)	2.00(1.00, 4.00)	2.00(3.00, 4.00)	0.043*
Hospital stay (days)	27.00(20.00, 38.00)	31.00(23.00, 54.00)	0.149
SNP	17	5	0.041*
Thrombo-embolism	15	10	0.922

Abbreviations: SD, standard deviation; ISS, Injury Severity Score; AIS, Abbreviated Injury Scale; PRBCs, packed red blood cells; SNP, sciatic nerve palsy

in 15 and 7 patients, respectively, and thromboembolism occurred in 17 and 8. There was a significant difference in the ISS between the two groups (p=0.024), but there were no significant differences in the AIS score, PRBCs, operation frequency, hospital stay, SNP, or thromboembolism (Table 2).

Comparison of patients according to location of femoral fracture

Patients with pelvic or acetabular fractures combined with proximal or non-proximal femoral fracture

Forty-five patients had pelvic or acetabular fractures with proximal femoral fractures, and 31 patients had non-proximal femoral fractures. The mean ISSs in the two groups were 21.47±10.67 and 17.61±7.64, and the mean AIS scores were 13.31±9.71 and 9.52±4.32, respectively. Twenty-two patients were diagnosed with SNP, and 17 of them had a proximal femoral fracture. The numbers of patients with thromboembolism in the two groups were 15 and 10, respectively. There were significant between-group differences in the mechanism of injury (p=0.018), AIS score (p=0.009), operation frequency (p=0.043), and SNP (p=0.041). There was no significant difference in the ISS, PRBCs, hospital stay, or thromboembolism between the two groups (Table 3).

Table 4 Demographics of patients with pelvic fracture combined with femoral fracture

Characteristics	Proximal femur fracture	Non-proximal femur fracture	P-value
Number of cases	33	21	
ISS	23.00 ± 10.83	19.10 ± 7.67	0.128
ASS	14.73 ± 9.28	10.29 ± 4.84	0.026*
PRBCs (units)	2.00(0.00, 6.00)	4.00(1.75, 4.50)	0.564
Operation frequency (times)	2.00(1.00, 4.00)	3.00(2.00, 4.50)	0.091
Hospital stay (days)	27.00(20.00, 49.00)	35.00(23.00, 56.00)	0.177
SNP	14	1	0.003*
Thrombo-embolism	9	8	0.406

Abbreviations: ISS, Injury Severity Score; AIS, Abbreviated Injury Scale; PRBCs, packed red blood cells; SNP, sciatic nerve palsy

Patients with pelvic fracture combined with femoral fracture

Thirty-three patients had pelvic fractures with proximal femoral fractures, and 21 had non-proximal femoral fractures. The mean ISSs were 23.00±10.83 and 19.10±7.67, and the mean AIS scores were 14.73±9.28 and 10.29±4.84, respectively. The numbers of patients with SNP in the two groups were 14 and 1, respectively. There were significant differences in the AIS score (p=0.026) and SNP (p=0.003) between the two groups, but no significant differences were observed in PRBCs, operation frequency, hospital stay, or thromboembolism (Table 4).

Patients with acetabular fracture combined with femoral fracture

Twelve patients had an acetabular fracture with proximal femoral fracture and 10 had a non-proximal femoral fracture. There was no significant difference in the ISS, AIS score, PRBCs, operation frequency, hospital stay, SNP, or thromboembolism between the two groups (Table 5).

Comparison of patients with pelvic combined with proximal femoral fractures and acetabular combined with proximal femoral fractures

Of the 45 patients with proximal femoral fractures, 33 had pelvic fractures and 12 had acetabular fractures. The mean ISSs were 23.00±10.83 and 17.25±9.37 with no significant difference, and the mean AIS scores were

Table 5 Demographics of patients with Acetabular Fracture combined with femoral fracture

Characteristics	Proximal femur fracture	Non-proximal femur fracture	P-value
Number of cases	12	10	
ISS	17.25 ± 9.37	14.50 ± 6.93	0.451
ASS	11.67 ± 10.92	7.90 ± 2.42	0.268
PRBCs (units)	4.00(0.00, 4.00)	4.00(2.00, 6.50)	0.206
Operation frequency (times)	2.00(1.00, 3.50)	2.50(2.00, 3.00)	0.218
Hospital stay (days)	22.50(15.00, 33.00)	26.00(21.75,33.50)	0.322
SNP	3	4	0.652
Thrombo-embolism	6	2	0.138

Abbreviations: ISS, Injury Severity Score; AIS, Abbreviated Injury Scale; PRBCs, packed red blood cells; SNP, sciatic nerve palsy

Table 6 Demographics of patients with pelvic or acetabular fractures combined with proximal femoral fractures

Characteristics	Pelvic	Acetabular	P-value
Number of cases	33	12	
ISS	23.00 ± 10.83	17.25 ± 9.37	0.111
AIS	14.73 ± 9.28	11.67 ± 10.92	0.105
PRBCs (units)	2.00(0.00, 6.00)	4.00(0.00, 4.00)	0.571
Operation frequency (times)	2.00(1.00, 3.50)	2.00(1.00, 4.00)	0.767
Hospital stay (days)	27.00(20.00, 49.00)	22.50(15.00, 33.00)	0.129
SNP	14	3	0.286
Thrombo-embolism	9	6	0.160

Abbreviations: ISS, Injury Severity Score; AIS, Abbreviated Injury Scale; PRBCs, packed red blood cells; SNP, sciatic nerve palsy

14.73±9.28 and 11.67±10.92. Seventeen patients had SNP, 14 of whom had pelvic fractures.

There was a significant difference in the mechanism of injury between the two groups, but there was no significant difference in additional injuries, PRBCs, operation frequency, hospital stay, SNP, or thromboembolism (Table 6).

Discussion

A fracture of the pelvis or acetabulum in combination with a fracture of the ipsilateral femur is known as a floating hip and is usually caused by high-energy trauma. Floating hip is usually complicated by multisystem organ injury, which is associated with a high rate of disability and mortality. There is also a relatively high risk of complications from this injury, such as sciatic nerve paralysis, deep vein thrombosis, and heterotopic ossification. In previous studies, the proportion of male patients with floating hip was significantly higher than that of female patients [3, 5, 8–11, 18, 19]. Meena et al. [18] suggested that this may be due to the fact that men have more exposure to the outdoors than women. Cech et al. [5] reported that 41% of floating hips were caused by traffic injuries and that 26% were caused by a fall from a height. In the present study, the proportion of male patients was 64.47% and the most common mechanisms of injury were motor vehicle collision and a fall from a height; these findings are consistent with their results.

The Müller classification is currently the most commonly used system for floating hip [6]. This classification focuses on the pelvic component of the fracture without elaborating on the femoral component. Previous studies have not provided a detailed classification of the femoral component of floating hip injuries. For example, it is clearly inappropriate to define a floating hip as a femoral condyle fracture with a pelvic or acetabular fracture. Bonnevialle and Pidhorz [20] reported that nearly 25% of patients with supracondylar femoral fractures have a combined popliteal vascular injury. Moreover, injuries to the area around the hip joint can have a more significant impact on the neurovascular system of the hip joint. In the present study, we compared patients with proximal and non-proximal femoral fractures. The results showed that there was a significant difference in the AIS score and the incidence of SNP between the two groups. Therefore, the previous classification may not completely reflect the characteristics of floating hip.

Floating hip injuries are usually associated with multiple trauma to other parts of the body, including the head, abdomen, and chest [7]. One of the most commonly associated injuries is chest injury [5]. In our study, proximal femoral fractures most often occurred in conjunction with chest injuries (44.4%), whereas non-proximal femoral fractures most often occurred in conjunction with ipsilateral lower extremity injuries (45.2%). The mean ISSs were 21.47±10.67 and 17.61±7.64 in the two groups, which were similar to the ISS of 21 reported by Cannada et al. [8] However, the mean AIS scores of the two groups were 13.31±9.71 and 9.52±4.32, respectively, with a significant difference (p=0.009). We subsequently compared the ISS and AIS scores between the two groups of patients with pelvic fractures or acetabular fractures. The AIS scores were significantly different between the two groups in pelvic patients. Liebergall et al. [11] reported that dashboard injuries were more likely to cause a posterior type of acetabular fracture combined with a diaphyseal femoral fracture, whereas lateral blows were associated with a central type of acetabular fracture combined with a proximal femoral fracture. This may suggest that different mechanisms contribute to different injury combinations.

A true floating hip involves a number of combinations of pelvic and femoral injuries, but this has not been analyzed in detail in previous studies. In our study, 45 patients had proximal femoral fractures. The most common type of pelvic fracture in these patients was type

C1 (30.3%, 10/33), and the acetabular fracture usually involved the posterior wall (58.3%, 7/12). This is consistent with previous studies [21–23]. Furthermore, the most common type of proximal femoral fracture was a femoral neck fracture. Interestingly, femoral head fractures were only present in patients with acetabular fractures, while subtrochanteric fractures were only present in patients with pelvic fractures. This has not been previously reported in the literature. It may be a contingent result due to the small sample size.

Traumatic SNP is a serious complication of floating hip, with a reported incidence of approximately 15.6–35.0% of all cases of floating hip [3, 5–7, 24, 25]. Delays in diagnosis and treatment may result in a poor prognosis [26]. Burd et al. [9] reported that SNP occurred in 46% of patients with complete pelvic or acetabular fractures and in 14% of patients with incomplete fractures. Judet et al. [27] found that SNP was associated with posterior fractures or dislocations of the hip joint. In our study, the incidence of SNP was 28.9% (22/76), which is consistent with the result of most of the other studies. Among these cases of SNP, 17 cases occurred in patients with proximal femoral fractures and 12 occurred in patients with non-proximal femoral fractures ($p=0.041$). This seems to indicate that patients who have floating hip with proximal femoral fractures have a higher risk of developing SNP. We subsequently compared patients with pelvic and acetabular fractures separately and found that this phenomenon was also present in patients with pelvic fractures ($p=0.003$). Thus, such injuries induce more serious damage around the hip joint and have a higher risk of SNP, which reinforces the idea that this type of injury may be a "true" floating hip. However, we did not find this difference in patients with acetabular fractures. This may be explained by the fact that traumatic SNP is common in patients with fractures involving the posterior wall or posterior column of the acetabulum and is associated with the mechanism of this type of injury [21, 28, 29]. In our study, 66.67% of patients with acetabular fractures had a fracture of the posterior wall or column of the acetabulum.

The femur is the longest bone in the body [30]. It may not be appropriate to include all femoral fractures in the concept of "floating hip." Therefore, we compared the clinical characteristics of patients with different fracture pattern combinations. We found that the AIS scores and SNP rates were significantly higher in patients with proximal than non-proximal femoral fractures, and there was no significant difference in thromboembolism, PRBCs, operation frequency, or hospital stay between patients with proximal and non-proximal fractures. This difference was more pronounced in patients with pelvic fractures, but the opposite was true in those with acetabular fractures.

This study has several limitations. First, this was a retrospective analysis, and not all potential biases could be excluded. This also led us to include only a limited number of complications. Second, this study was conducted in a single center and the sample size was small. This is to be expected given the relative rarity of floating hip. Larger multicenter studies are thus needed. Third, follow-up would be required to fully assess the clinical features and outcomes. Large-scale and long-term follow-up analysis of patients with floating hips is required.

Conclusion

More than half of patients with floating hips have a combined proximal femoral fracture. In this study, patients with a fracture of the pelvis or acetabulum combined with a proximal femoral fracture had a higher AIS score and higher risk of SNP than patients with a non-proximal femoral fracture. Patients with a single pelvic fracture showed similar results, but patients with a single acetabular fracture did not. A pelvic or acetabular fracture combined with a proximal femoral fracture has a different outcome than a mid-distal femoral fracture, which may be a "true" floating hip.

Abbreviations

SNP	Sciatic nerve palsy
SD	Standard deviation
ISS	Injury Severity Score
AIS	Abbreviated Injury Scale
PRBCs	Packed red blood cells

Acknowledgements

Not applicable.

Author contributions

LS and LLX conceived of the presented idea. ZXF wrote the main manuscript text. ZXF and LY collected and analyzed data. ZXF, ZAJ, ZXH and WCL prepared figures and tables. DJL and LFX supervised the study. LS, XWC, FF revised the manuscript. All authors approved the final version.

Funding

This study was supported by the Shandong Province Major Scientific and Technical Innovation Project (No. 2021SFGC0502), the Shandong Provincial Natural Science Foundation (No. ZR2021MH013; No. ZR2021QH307; No. ZR2020MH088; No.ZR2022MH056), the Jinan Clinical Medical Science and Technology Innovation Plan (NO. 202019168). The authors, their immediate families, and any research foundations with which they are affiliated have not received any financial payments or other benefits from any commercial entity related to the subject of this article.

Data availability

All data generated or analyzed during this study are included in this published article.

Declarations

Ethics approval and consent to participate

The experimental protocol was established, according to the ethical guidelines of the Helsinki Declaration and was approved by the Human Ethics Committee of Shandong Provincial Hospital Affiliated to Shandong First Medical University. Written informed consent was obtained from each study participants.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

Received: 27 July 2023 / Accepted: 22 November 2024
Published online: 03 December 2024

References

1. Irifune H, Hirayama S, Takahashi N, Narimatsu E. Ipsilateral Acetabular and Femoral Neck and Shaft Fractures. *Case reports in orthopedics* 2015, 2015:351465.
2. Wu CL, Tseng IC, Huang JW, Yu YH, Su CY, Wu CC. Unstable pelvic fractures associated with femoral shaft fractures: a retrospective analysis. Biomedical J. 2013;36(2):77–83.
3. Liebergall M, Lowe J, Whitelaw GP, Wetzler MJ, Segal D. The floating hip. Ipsilateral pelvic and femoral fractures. J bone Joint Surg Br Volume. 1992;74(1):93–100.
4. Browne RS, Mullan GB. Intertrochanteric fracture of the femur with ipsilateral central fracture of the acetabulum. Injury. 1980;11(3):251–3.
5. Cech A, Rieussec C, Kerschbaumer G, Seurat O, Corbet C, Vibert B, Tronc C, Ruatti S, Bouzat P, Tonetti J, et al. Complications and outcomes in 69 consecutive patients with floating hip. Orthop Traumatol Surg Research: OTSR. 2021;107(6):102998.
6. Müller EJ, Siebenrock K, Ekkernkamp A, Ganz R, Muhr G. Ipsilateral fractures of the pelvis and the femur–floating hip? A retrospective analysis of 42 cases. Arch Orthop Trauma Surg. 1999;119(3–4):179–82.
7. Brioschi M, Randelli F, Capitani P, Capitani D. Floating hip in polytraumatized patients: complications, mechanism of injury, and surgical strategy. Int Orthop. 2022;46(2):361–8.
8. Cannada LK, Hire JM, Boyer PJ, Israel H, Mir H, Halvorson J, Della Rocca GJ, Ming B, Mullis B, Deshpande C. Treatment and complications of patients with Ipsilateral Acetabular and Femur fractures: a Multicenter Retrospective Analysis. J Orthop Trauma. 2017;31(12):650–6.
9. Burd TA, Hughes MS, Anglen JO. The floating hip: complications and outcomes. J Trauma. 2008;64(2):442–8.
10. Zamora-Navas P, Guerado E. Vascular complications in floating hip. Hip International: J Clin Experimental Res hip Pathol Therapy. 2010;20(Suppl 7):S11–18.
11. Liebergall M, Mosheiff R, Safran O, Peyser A, Segal D. The floating hip injury: patterns of injury. Injury. 2002;33(8):717–22.
12. Wei L, Sun JY, Wang Y, Yang X. Surgical treatment and prognosis of acetabular fractures associated with ipsilateral femoral neck fractures. Orthopedics. 2011;34(5):348.
13. Bishop JA, Cross WW 3rd, Krieg JC, Chip Routt ML Jr. Antegrade femoral nailing in acetabular fractures requiring a Kocher-Langenbeck approach. Orthopedics. 2013;36(9):e1159–1164.
14. Jockel CR, Gardenal RM, Chen NC, Golden RD, Jupiter JB, Capomassi M. Intermediate-term outcomes for floating elbow and floating elbow variant injuries. J Shoulder Elbow Surg. 2013;22(2):280–5.
15. Ditsios K, Boutsiadis A, Papadopoulos P, Karataglis D, Givissis P, Hatzokos I, Christodoulou A. Floating elbow injuries in adults: prognostic factors affecting clinical outcomes. J Shoulder Elbow Surg. 2013;22(1):74–80.
16. Tile M. Pelvic ring fractures: should they be fixed? J bone Joint Surg Br Volume. 1988;70(1):1–12.
17. Judet R, Judet J, Letournel E, FRACTURES OF THE ACETABULUM: CLASSIFICATION AND SURGICAL APPROACHES FOR OPEN REDUCTION. PRELIMINARY REPORT. J bone Joint Surg Am Volume. 1964;46:1615–46.
18. Meena UK, Bansal MC, Behera P, Goyal D, Kumar R. Concomitant ipsilateral acetabular and femoral fractures - an appraisal of outcomes and complications in 34 patients. Acta Orthop Belg. 2021;87(3):401–10.
19. Perumal R, Valleri DP, Yalavarthi RK, Tumati SB, Jayaramaraju D, Shanmuganathan R. How safe is Antegrade femoral nailing in Ipsilateral Acetabulum fractures requiring Kocher-Langenbeck Approach? An analysis of 23 fractures. Indian J Orthop. 2022;56(4):592–600.
20. Bonnevialle P, Pidhorz L. [Dislocation and fractures around the knee with popliteal artery injury: a retrospective analysis of 54 cases]. Rev Chir Orthop Reparatrice Appar Mot. 2006;92(5):508–16.
21. Liu Z, Fu B, Xu W, Liu F, Dong J, Li L, Zhou D, Hao Z, Lu S. Incidence of Traumatic Sciatic Nerve Injury in Association with Acetabular fracture: a retrospective observational single-center study. Int J Gen Med. 2022;15:7417–25.
22. Lu S, Liu F, Xu W, Zhou X, Li L, Zhou D, Li Q, Dong J. Management of Open Tile C pelvic fractures and their outcomes: a retrospective study of 30 cases. Ther Clin Risk Manag. 2022;18:929–37.
23. Singh A, Min Lim AS, Huh Lau BP, O'Neill G. Epidemiology of pelvic and acetabular fractures in a tertiary hospital in Singapore. Singapore Med J. 2022;63(7):388–93.
24. Zamora-Navas P, Estades-Rubio FJ, Cano JR, Guerado E. Floating hip and associated injuries. Injury. 2017;48(Suppl 6):S75–80.
25. Hammad AS, Rashed RA, Abu-Sheasha G, El-Bakoury A. Functional outcome and health-related quality of life following ipsilateral femoral and acetabular fractures: a retrospective analysis. Sicot-j. 2021;7:52.
26. Issack PS, Helfet DL. Sciatic nerve injury associated with acetabular fractures. HSS Journal: Musculoskelet J Hosp Special Surg. 2009;5(1):12–8.
27. Judet R, Judet J, Letournel EJAB. Fractures Acetabulum. 1993;30:285–93.
28. Cornwall R, Radomisli TE. Nerve injury in traumatic dislocation of the hip. Clin Orthop Relat Res 2000(377):84–91.
29. Simske NM, Krebs JC, Heimke IM, Scarcella NR, Vallier HA. Nerve Injury with Acetabulum fractures: incidence and factors affecting recovery. J Orthop Trauma. 2019;33(12):628–34.
30. Chen J, Shen J, Yang X, Tan H, Yang R, Mo C, Wang Y, Luan X, Huang W, Chen G et al. Exploring the Temporal Correlation of Sarcopenia with Bone Mineral Density and the Effects of Osteoblast-Derived Exosomes on Myoblasts through an Oxidative Stress-Related Gene. *Oxidative medicine and cellular longevity* 2022, 2022:9774570.

Publisher's note