Management of Hoffa fractures. A series of cases from the Alcívar Hospital.

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Traumatology

Abstract

Introduction: Isolated fractures of the posterior unilateral condyles of the femur in the coronal plane are rare and known as Hoffa fractures. They have an absolute surgical indication; only cannulated screws have been used in the anteroposterior direction, followed by screws associated in the transverse direction, and currently, to increase stability, neutralization plates are also used.

Methods: For 10 years (January 2014 to September 2024), three patients with Hoffa fractures were operated on at the Alcívar Hospital, and the Letenneur and Bagaria classification was used. KSS score at 3 and 6 months after surgery.

Results: Hoffa fractures accounted for 0.25% of all fractures. All patients were male, with an average age of 29 years. Only one patient experienced a high-energy accident and presented associated injuries, and the others were low-energy fractures with a predisposing condition. In two cases, only three cannulated screws were used; in one case, two cannulated screws and two neutralization plates were used. There was consolidation in the third month, partial support at 10 weeks, and total support at 12 weeks, and the final functional results were more significant than 80 points in the three patients.

Conclusion: This injury has an absolute surgical indication, requiring precise anatomical reduction and stable fixation, allowing early knee mobilization. Currently, the ideal fixation method is the combination of 2-plane cannulated screws and neutralization plates.

Keywords:

Hoffa fracture, cannulated screws, neutralization plate.

Abbreviations

NMR: Nuclear magnetic resonance.

Supplementary information

No supplementary materials are declared.

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Authors' contributions

Hugo Ernesto Villarroel Rovere: Conceptualization, data curation, formal analysis, acquisition of funds, research, writing - original draft, writing - original draft, writing - review and editing.
Maria Dolores Delgado Zambrano: Conceptualization, formal analysis, acquisition of funds, research, writing - original draft, writing – review, and editing.
Manuel Rodríguez Espinoza de los Monteros: Acquisition of funds, Research, Methodology, Project administration, Resources, Software, and Supervision.
Adrián Ernesto Villarroel Pérez, conceptualization, data curation, formal analysis, acquisition of funds, research, visualization, writing - original draft.
All the authors read and approved the final version of the manuscript.

Financing

The authors financed the administrative costs of this research. The patients included in the study underwent surgical procedures covered by their private insurance. Surgical costs were adjusted to the standard rates of the trauma service, reflecting the usual market prices for this type of intervention.

Availability of data and materials

The datasets used and analyzed during the present study are available from the corresponding author upon reasonable request.

Introduction

Articular and isolated fractures of the posterior unilateral condyles of the femur in the coronal plane are known as Hoffa fractures. First described by Busch in 1869, they were popularized by the German orthopedist Albert Hoffa in 1904 [1] (Figure 1 a and b). They are rare fractures, representing a small percentage of all distal femur fractures [2 -4].

Hoffa fracture is caused by high-energy trauma, such as traffic accidents and falls from a height; hence, it is common to find both bone- and soft tissue-associated injuries [5 -7]. The mechanisms of injury described vary between high- and low-energy cases. In high-energy instances, the injury is usually the result of an axial compression force when the knee is flexed to 90 degrees or more, with varus or valgus positions where the plate tibia impacts the posterior femoral condyle. The fracture line's direction depends on the knee's flexion angle at impact. When associated fractures occur in the patella, they are usually the result of combined mechanisms of action. On the other hand, low-energy mechanisms are observed in patients with immature skeletons or with severe osteoporosis [8 -10].

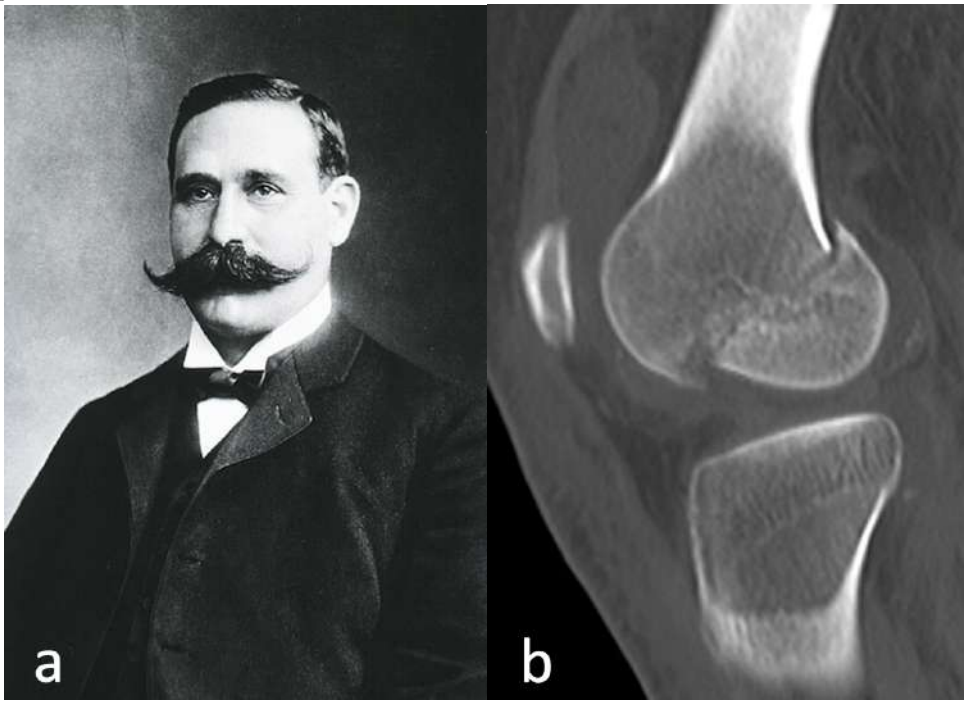
Plain radiography is widely used because it is accessible and low-cost. However, approximately 25% of patients initially receive an inaccurate diagnosis via radiography [11 -13], which highlights the importance of high clinical suspicion and the complementary use of CT with 3D reconstruction. Magnetic resonance imaging (MRI) can detect soft tissue injuries such as cruciate ligament, meniscal, and chondral injuries [14,15].

Conservative treatment has shown poor results for this type of fracture, either because the soft tissues are interposed at the time of fracture consolidation or because the poor reduction of the joint surface causes early osteoarthritis in young patients with this type of fracture. Thus, the mandatory indication is open reduction via either a medial or lateral approach without altering the extensor apparatus to facilitate early mobility [16].

Concerning fixation, the traditional method involves the use of cannulated screws, either in the anteroposterior or posteroanterior direction, or a new process, which consists in placing them in parallel intercondylar, the purpose of which is to reduce the fracture and avoid rotation of the fragment. Currently, the combined fixation technique, which consists of adding support plates to cannulated screws, is used to achieve a better anatomical reduction of the articular surface, more excellent stability, and early mobility [17 -19].

Postsurgical management of these patients involves early joint mobilization; however, support should be strictly limited to 12 weeks, and the consolidation of the fracture should be monitored monthly [19].

Figure 1. Reference image to Albert Hoffa.



* a. Albert Hoffa 1859-1907, b. Fracture in the coronal plane of the femoral condyle.

Materials and methods

Study design

The present observational study is a case series.

Stage

The study was conducted in the Orthopedics and Traumatology Service of the Alcívar Hospital in Guayaquil, Ecuador, from January 1, 2014, to September 30, 2024.

Participants

Records of adult patients with Hoffa fracture classified by Letenneur (2010--2023) and Bagaria classification (2024) were included. No patients were eliminated or excluded.

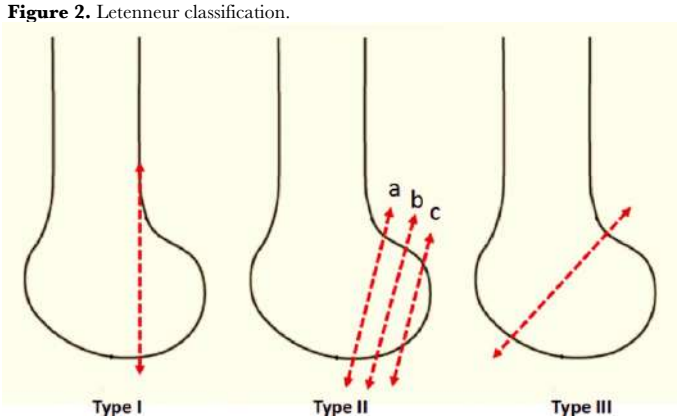
Variables

The variables used were age, sex, cause of injury, associated injury, fracture type, meniscus injury, ligament injury, osteosynthesis, immobilization, consolidation, rehabilitation, and functional results according to the American Knee Society Scale (KSS) [19].

Data sources/measurements

The source was indirect; an electronic form was filled out from the medical history data. The Letenneur classification [20], mentioned by Zhou [21] (Figure 2), is the most internationally recognized. It is based on the lateral projection of the radiograph to evaluate the fracture line, ligaments, and soft tissues, which are crucial aspects for management and prognosis.

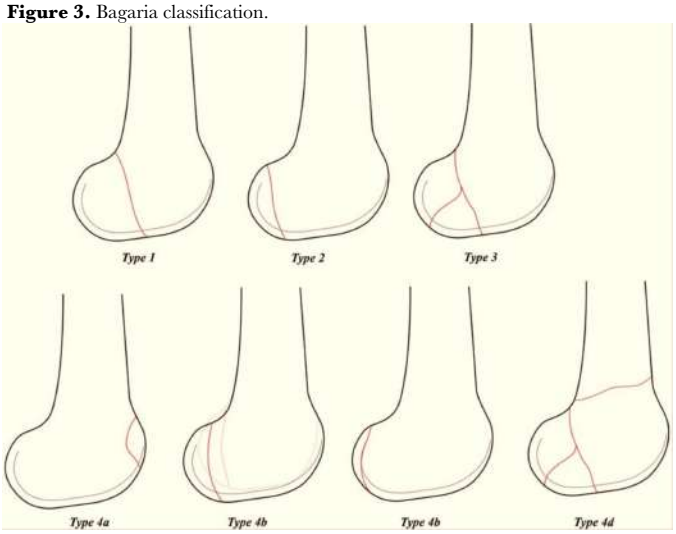
Figure 2. Letenneur classification.



* Letenneur classification: Type I: Vertical feature that extends from the posterior femoral cortex. Type IIA: Feature parallel to the posterior femoral cortex that involves 75% of the femoral condyle. Type IIB: Similar to type IIA, but involves 50% of the femoral condyle. Type IIC: Also parallel to the posterior femoral cortex, affecting 25% of the femoral condyle. Type III: It exhibits an anterior oblique feature in relation to the joint capsule, ligaments and muscular structures.

Since 2024, we have used the Bagaria tomographic classification published in 2019 22. This classification proposes a treatment modality according to the type of fracture and the approach for each type of injury (Figure 3).

Figure 3. Bagaria classification.



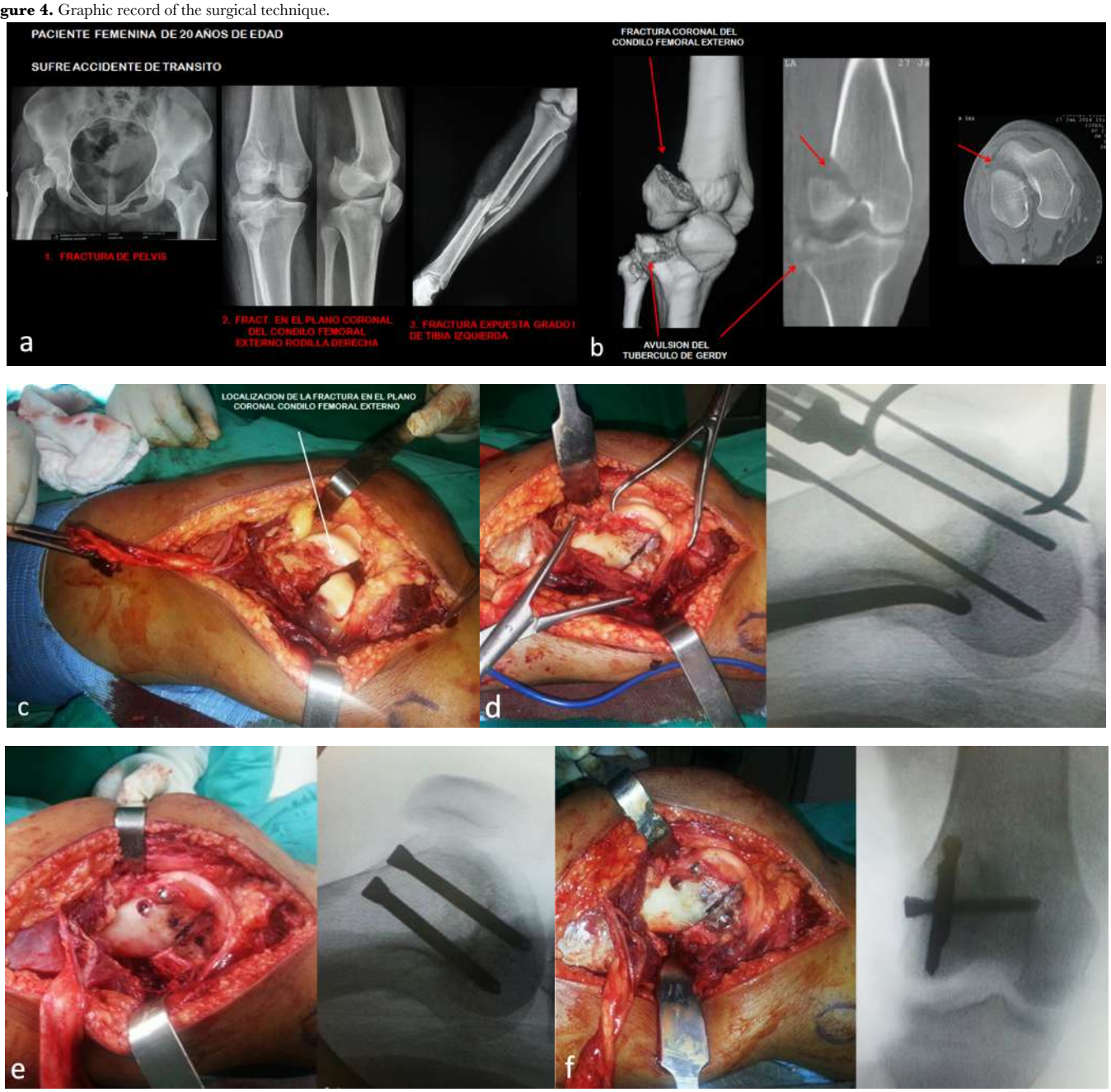
* • Type 1: The fracture line passes coronally at or near the junction of the posterior femoral condyle and the shaft of the femur. The size of the fragment is> 2.5 cm from the tip of the most posterior point of the posterior condyle.
• Type 2: the fracture line passes behind the junction of the posterior femoral condyle and the shaft with a fragment size <2.5 cm.
• Type 3: Comminuted coronal fractures of the femoral condyle.
• Type 4 - Special types
4th are earlier
4b bicondylar
4c marginals
4d are associated with supracondylar fractures.

Surgical technique

Cannulated screws

Three-dimensional CT is planned for this patient. In the lateral approach, anatomical reduction of the fracture is performed, the decrease with Steinmann's nails is maintained, and two cannulated screws are placed parallel and directed in an anteroposterior direction to make interfragmentary compression and to avoid rotation of the fragment. A third nail is also placed transversely to increase stability (Figure 4, Figure 5, and Figure 6).

Figure 4. Graphic record of the surgical technique.



* Figura 4:

a. 20-year-old female patient, polytraumatized, admitted on January 27, 2014 with injury to the pelvic ring, severe injury to the right knee and exposed fracture of the left tibia.

b. In the knee he presents avulsion of Gerdy's tubercle and Letenneur's type III Hoffa fracture,

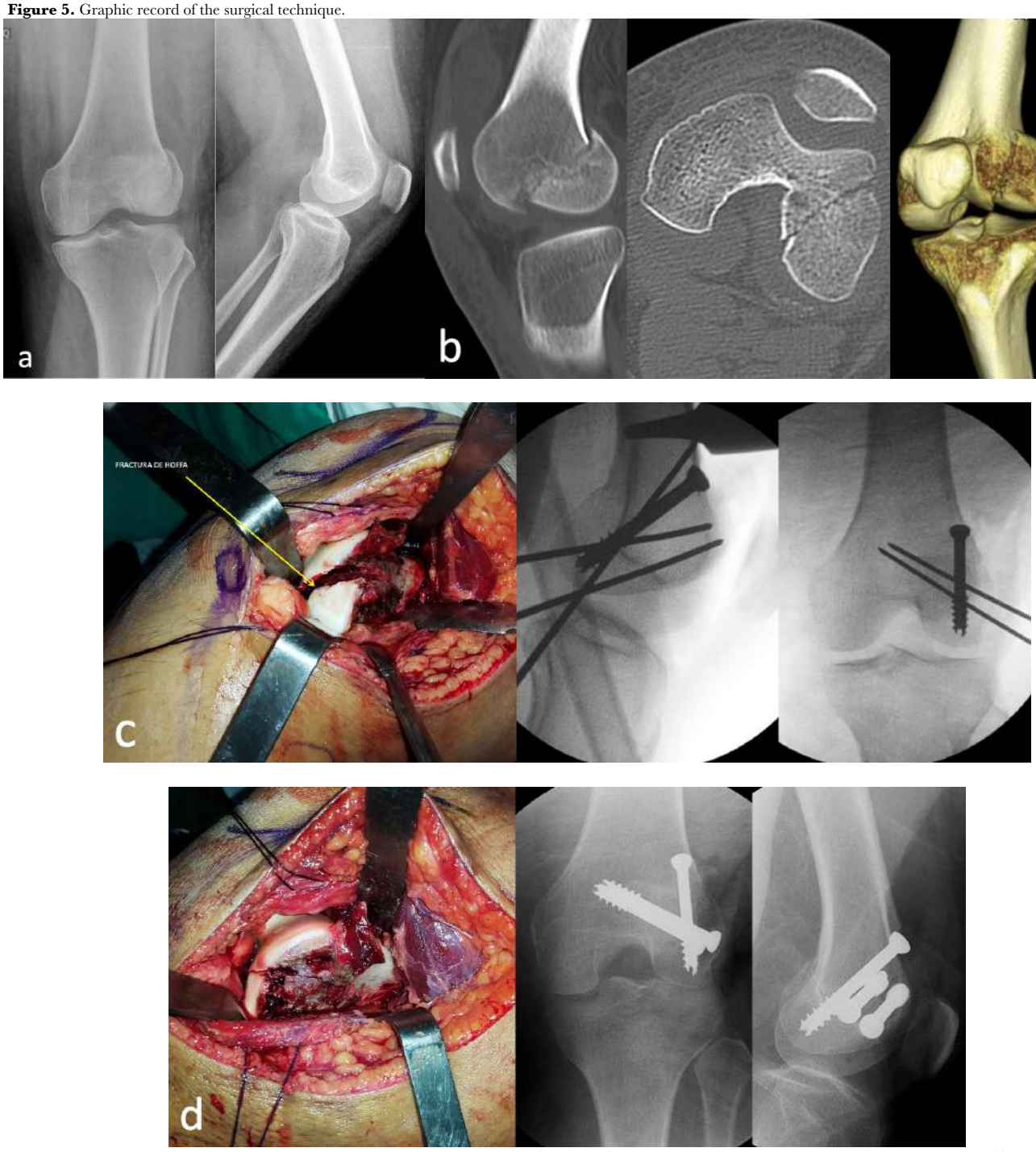
c. Lateral approach and lifting of the fascia lata from the avulsed Gerdy,

d. Fracture reduction and temporary fixation with 2 parallel Steinmann nails,

e. Two cannulated screws are placed parallel in the sagittal plane and perpendicular to the fracture line for interfragmentary compression, f. A third cannulated screw is placed in the transverse and intercondylar plane to enhance stability.

Graphic document of the Alcívar Hospital.

Figure 5. Graphic record of the surgical technique.



* Figure: a and b. A 28-year-old male patient with a history of Down Syndrome, admitted on January 31, 2016, suffered a fall in body height, presenting pain, edema and functional impotence in the left knee. Radiological images show a Hoffa Type III Letenneur fracture,

c. Lateral approach, the reduction of the fracture with Steinmann nails is maintained, a cannulated screw is used in an anteroposterior direction to achieve interfragmentary compression,

d. Two cannulated screws are then placed in the transverse and intercondylar plane to reinforce stability.

Graphic document of the Alcívar Hospital.

Figure 6. Graphic record of the surgical technique.

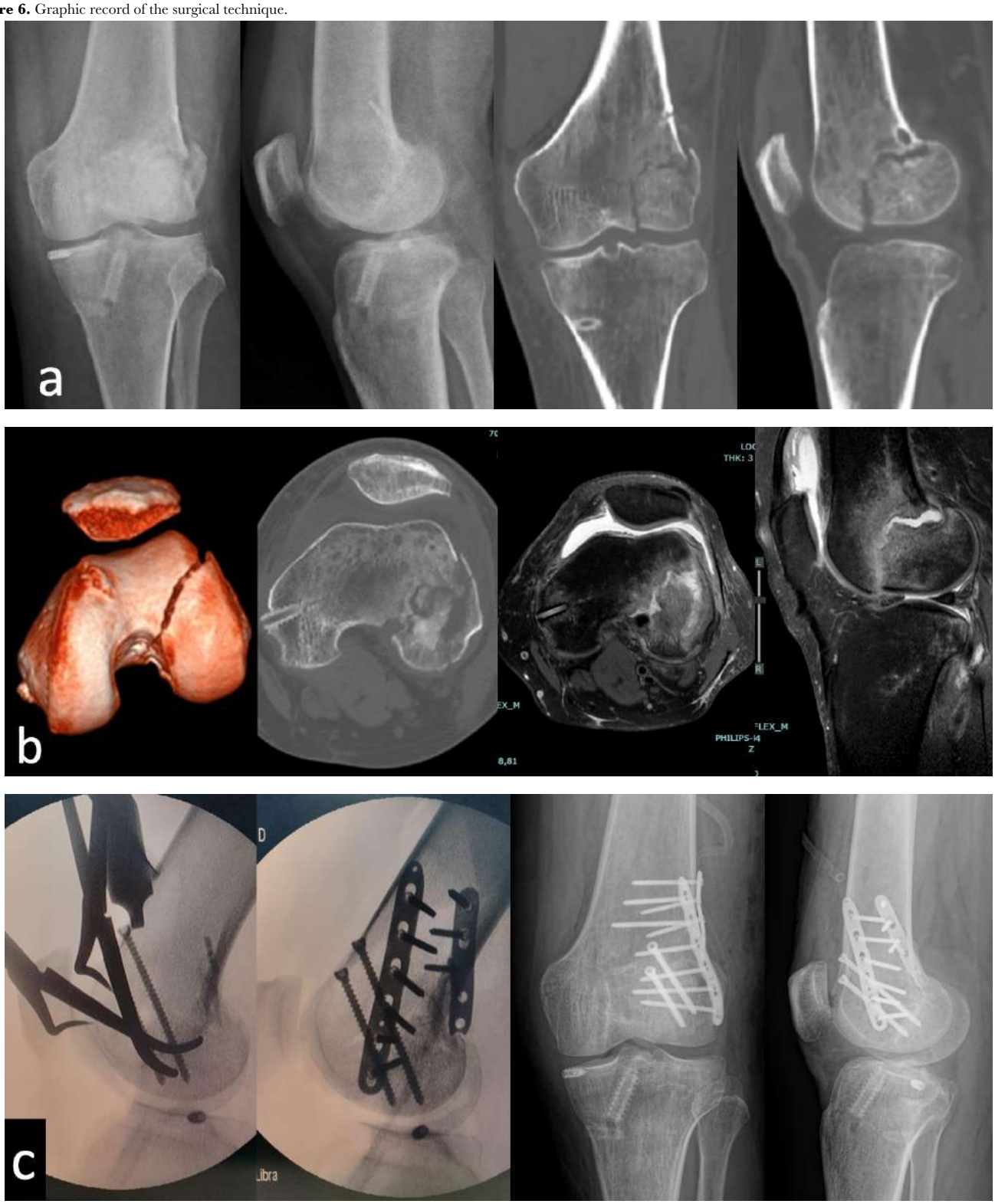


Figure 6: a. A 38-year-old male patient, a history of ACL and PCL plasty in 2023, was admitted on March 14, 2024, suffered a fall from his own height with an impact on the left knee, presenting severe pain, edema, deformity and functional limitation. Imaging studies show Type I Hoffa fracture according to the Bagaria tomographic classification, b. It is verified with the imaging studies that the weak point of the external condyle is in the path of the tunnel previously made for the ligament plasty, therefore the low-energy trauma produced the fracture, it also presents a lesion of the external meniscus, c. We performed open reduction and placement of 2 cannulated screws in an anteroposterior direction and 2 force neutralization plates. The external meniscus that was injured was also repaired. ***Graphic document of the Alcívar Hospital.***

Results

Three of the 1,200 cases registered during the observation period had Hoffa fractures, with an incidence of 0.25%. The data of the three treated patients are summarized in Table 1.

Table 1. Demographic and clinical characteristics of the study group.

	Case 1	Case 2	Case 3
Age	20 años	28 años	38 años
Sex	Female	Male	Male
Cause	High energy trauma; traffic accident (January 27, 2014)	Low energy trauma; Fall and metabolic alteration (Osteopenia) due to Down syndrome (January 31, 2016).	Low energy trauma, fall and weak point in external condyle tunnel due to plasty of cruciate ligaments (March 14, 2024).
Associated injury	-Pelvic ring injury -Exposed tibia fracture	No	No
Type of fracture	Letenneur Type III	Letenneur Type III	Bagaria Type I
Meniscus injury	Yes	Yes	No
Ligament injury	No	No	No
Osteosynthesis	2 Cannulated Screws Ap Y 1 Transverse	1 Ap Y Cannulated Screw; 2 Transverse	2 Cannulated Screws Ap Y; 2 Support Plates
Immobilization	Articulated Brace and Crutches	Articulated Brace and Crutches	Articulated Brace and Crutches
Consolidation	3 months	3 months	2 months
Rehabilitation	• Isometrics and passive flexion from day one. • Active flexoextension after 10 days. • Quadriceps strengthening after 15 days.	• Isometrics and passive flexion from day one. • Active flexoextension after 10 days. • Quadriceps strengthening after 15 days.	• Isometrics and passive flexion from day one • Active flexoextension after 10 days. • Quadriceps strengthening after 15 days
Support	Partial support 10 weeks, full support at 3 months.	Partial support 10 weeks, Full support at 3 months.	Partial support 8 weeks, full support at 3 months.
3 months postoperative	88 (Excelente)	91 (Excelente)	83 (Excelente)
6 months postoperative	88 (Excelente)	91 (Excelente)	83 (Excelente)

* P<0.05 *** P<0.001.

Discussion

Distal femur fractures represent approximately 7% of all femur fractures; these fractures are "Hoffa fractures" and represent 0.65% of all femoral fractures. They are primarily associated with high-energy trauma. The two leading causes are motorcycle accidents (80.5%) and falls from height (9.1%) [1, 21]. In Alcívar Hospital, the incidence of Hoffa fractures was 0.25%. In one of our cases, the cause was high-energy trauma in a traffic accident. In the other two cases, the cause was low-energy trauma due to the resistance of the bone (osteopenia in one patient with Down syndrome and, in the other patient, tunnel in the external condyle after cruciate ligament plasty).

When the degree of trauma is high, other traumatic injuries can be associated, such as fracture of the tibia; dislocation of the patella and knee; supra- and intercondylar fractures; fractures of the pelvis and femoral diaphysis; arterial injuries; and open fractures, which are 2.8 times more common than closed fractures [24-27]. In one of our cases, there was high-energy trauma in a traffic accident, with an injury to the pelvic ring and an exposed fracture of the tibia as associated injuries.

In Hoffa fractures, surgical treatment aims to achieve anatomical reduction of the articular surface of the condyle, with internal fixation with either screws or plates via an open technique [28, 29]. Traditionally, internal fixation has been performed with two cancellous screws perpendicular to the fracture line, thereby achieving compression of the fragment and a reduction in the risk of rotation [30, 31]. Studies have shown that placing intercondylar screws has a similar result to the traditional method of placing anteroposterior screws [16, 17]. In 2 of our cases, interfragmental compression was performed with anteroposterior screws, and stability was supplemented with transverse intercondylar screws, achieving consolidation and total support at 12 weeks on average.

Using a combination with a support plate results in a more significant anatomical reduction of the articular surface of the distal femur and more excellent stability and support in the support application [18, 19]. In one of our patients, we used a combination of 2 AP screws and two neutralization plates, achieving complete consolidation and support at 12 weeks.

The injured limb should be mobilized on the first day with a continuous passive motion device for postoperative management. Partial support with crutches begins between 10 and 12 weeks after surgery. Full support is allowed when there is radiographic evidence of healing, generally occurring approximately 12 weeks after surgery 32. In our patients, our scheme was similar, promoting isometric exercises and passive

mobilization from the first day. In the knee, the patient walks to school with crutches without limb support; muscle strengthening begins at 2 weeks, partial support with crutches starts at 10 weeks, and monthly radiological follow-up consolidates at 12 weeks. It authorizes support with full limb load, even in patients with associated pelvic and contralateral tibial injuries.

Conclusions

1. Our records confirm that Hoffa fractures are rare, with only three cases in the last ten years.
2. This injury has an absolute surgical indication and requires precise anatomical reduction and stable fixation, allowing us to mobilize the knee early.
3. Currently, the ideal stable fixation technique most frequently used is the combination of cannulated screws and neutralization plates for shear forces.

References

1. Patel PB, Tejwani NC. The Hoffa fracture: Coronal fracture of the femoral condyle a review of literature. J Orthop. 2018 May 7;15(2):726-731. doi: 10.1016/j.jor.2018.05.027. PMID: 29881228; PMCID: PMC5990301.

2. Manfredini M, Gildone A, Ferrante R, Bernasconi S, Massari L. Unicondylar femoral fractures: therapeutic strategy and long-term results. A review of 23 patients. Acta Orthop Belg. 2001 Apr;67(2):132-8. PMID: 11383291.

3. Arastu MH, Kokke MC, Duffy PJ, Korley RE, Buckley RE. Coronal plane partial articular fractures of the distal femoral condyle: current concepts in management. Bone Joint J. 2013 Sep;95-B(9):1165-71. doi: 10.1302/0301-620X.95B9.30656. PMID: 23997126.

4. Zhou Y, Pan Y, Wang Q, Hou Z, Chen W. Hoffa fracture of the femoral condyle: Injury mechanism, classification, diagnosis, and treatment. Medicine (Baltimore). 2019 Feb;98(8):e14633. doi: 10.1097/MD.0000000000014633. PMID: 30813201; PMCID: PMC6408088.

5. Jordan MC, Bittrich LA, Fehske K, Meffert RH, Jansen H. A rare case of Hoffa fracture combined with lateral patellar dislocation. Trauma Case Rep. 2017 May 31;9:13-16. doi: 10.1016/j.tcr.2017.05.001. PMID: 29644317; PMCID: PMC5883199.

6. Kapoor C, Merh A, Shah M, Golwala P. A Case of Distal Femur Medial Condyle Hoffa Type II(C) Fracture Treated with Headless Screws. Cureus. 2016 Sep 23;8(9):e802. doi: 10.7759/cureus.802. PMID: 27790391; PMCID: PMC5081261.

7. Trikha V, Das S, Gaba S, Agrawal P. Analysis of functional outcome of Hoffa fractures: A retrospective review of 32 patients. J Orthop Surg (Hong Kong). 2017 May-Aug;25(2):2309499017718928. doi: 10.1177/2309499017718928. PMID: 28673200.

8. Hill BW, Cannada LK. Hoffa Fragments in the Geriatric Distal Femur Fracture: Myth or Reality? Geriatr Orthop Surg Rehabil. 2017 Dec;8(4):252-255. doi: 10.1177/2151458517744076. Epub 2017 Dec 14. PMID: 29318088; PMCID: PMC5755847.

9. Joseph CM, Rama-Prasad YS, Boopalan P, Jepegnanam TS. Long Term Follow-up of an Open Bicondylar Hoffa Fracture with a Disrupted Extensor Mechanism: A Case Report. Malays Orthop J. 2019 Jul;13(2):59-62. doi: 10.5704/MOJ.1907.013. PMID: 31467656; PMCID: PMC6702977.

10. Harna B, Dutt Dwivedi D, Pippal HK, Sabat D. Bicondylar conjoint Hoffa's fracture with patella entrapped in the fracture: A rare case report. J Clin Orthop Trauma. 2018 Jun;9(Suppl 2):S35-S38. doi: 10.1016/j.jcot.2017.08.015. Epub 2017 Aug 24. PMID: 29928102; PMCID: PMC6008609.

11. Chandrabose R, Saha S, Kumar H, Tapadiya N, Hd B. A computed tomography-based classification of Hoffa fracture: Surgical treatment considerations and prognostic outcome with assessment of reproducibility. J Orthop. 2019 Dec 18;20:21-27. doi: 10.1016/j.jor.2019.12.011. PMID: 32021051; PMCID: PMC6994825.

12. Xie X, Zhan Y, Dong M, He Q, Lucas JF, Zhang Y, Wang Y, Luo C. Two and Three-Dimensional CT Mapping of Hoffa Fractures. J Bone Joint Surg Am. 2017 Nov 1;99(21):1866-1874. doi: 10.2106/JBJS.17.00473. PMID: 29088042.

13. Pires RE, Giordano V, Fogagnolo F, Yoon RS, Liporace FA, Kfuri M. Algorithmic treatment of Busch-Hoffa distal femur fractures: A technical note based on a modified Letenneur classification. Injury. 2018 Aug;49(8):1623-1629. doi: 10.1016/j.injury.2018.06.008. Epub 2018 Jun 4. PMID: 29885965.

14. Coon MS, Best BJ. Distal Femur Fractures. 2023 Jul 31. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan–. PMID: 31869139.

15. Somford MP, Nieuwe Weme RA, Hoornenborg D, Wiegerinck JI, van Raay JJAM, Brouwer RW, Williams A. Biographical background and origin of common eponymous terms in orthopedic surgery: anatomy and fractures in knee surgery. Eur J Orthop Surg Traumatol. 2018 Jan;28(1):79-84. doi: 10.1007/s00590-017-2005-x. Epub 2017 Jun 27. PMID: 28656366.

16. Mushtaq M, Dhar SA, Bhat TA, Dar TA. A case report of the Hoffa fracture and a review of literature. Chin J Traumatol. 2022 Sep;25(5):293-301. doi: 10.1016/j.cjtee.2022.01.002. Epub 2022 Jan 19. PMID: 35370061; PMCID: PMC9458991.

17. Xu Y, Li H, Yang HH, Pan ZJ. A comparison of the clinical effect of two fixation methods on Hoffa fractures. Springerplus. 2016 Jul 25;5(1):1164. doi: 10.1186/s40064-016-2861-6. PMID: 27512623; PMCID: PMC4960084.

18. Kouzelis A, Argyropoulou E, Stavros B, Papagiannis S, Antzoulas P, Gliatis J. Bilateral Hoffa Fractures of the Medial Femoral Condyles: A Case Report and Review of the Literature. J Orthop Case Rep. 2023 Dec;13(12):121-124. doi: 10.13107/jocr.2023.v13.i12.4102. PMID: 38162367; PMCID: PMC10753662.

19. Orapiriyakul W, Apivatthakakul T, Buranaphatthana T. How to determine the surgical approach in Hoffa fractures? Injury. 2018 Dec;49(12):2302-2311. doi: 10.1016/j.injury.2018.11.034. PMID: 30526925.

20. Letenneur J, Labor PE, Rogez JM, Lignon J, Bainvel JV. Fractures de Hoffa a propos de 20 observations [Hoffa's fractures. Report of 20 cases (author's transl)]. Ann Chir. 1978 Mar-Apr;32(3-4):213-9. French. PMID: 697301.

21. Dhillon MS, Mootha AK, Bali K, Prabhakar S, Dhatt SS, Kumar V. Coronal fractures of the medial femoral condyle: a series of 6 cases and review of literature. Musculoskelet Surg. 2012 Jun;96(1):49-54. doi: 10.1007/s12306-011-0165-0. Epub 2011 Sep 9. PMID: 21904943.

22. Bagaria V, Sharma G, Waghchoure C, Chandak RM, Nemade A, Tadepelli K, Pawar P. A proposed radiological classification system of Hoffa's fracture based on fracture configuration and consequent optimal treatment strategy along with the review of literature. SICOT J. 2019;5:18. doi: 10.1051/sicotj/2019016. Epub 2019 Jun 7. PMID: 31180317; PMCID: PMC6557153.

23. Insall JN, Dorr LD, Scott RD, Scott WN. Rationale of the Knee Society clinical rating system. Clin Orthop Relat Res. 1989 Nov;(248):13-4. PMID: 2805470.

24. Gammon L, Hansen E, Cheatham S. Technique for Reduction and Fixation of a Hoffa Fracture with Ipsilateral Patella Dislocation from Low-Energy Trauma, a Rare Injury: A Case Report. JBJS Case Connect. 2020 Jan-Mar;10(1):e0250. doi: 10.2106/JBJS.CC.19.00250. PMID: 32224673.

25. Liu Q, Wang W, Fan W, Zhu W. Hoffa fracture associated with tibial shaft fracture and multiple ligament avulsion fractures: A case report. Trauma Case Rep. 2020 Jan 17;26:100277. doi: 10.1016/j.tcr.2020.100277. Erratum in: Trauma Case Rep. 2023 Mar 01;45:100814. doi: 10.1016/j.tcr.2023.100814. PMID: 31989015; PMCID: PMC6970162.

26. Pathak S, Salunke A, Karn S, Ratna HVK, Thivari PS, Sharma S, Jena S. Hoffa's Fracture with Associated Injuries Around the Knee Joint: An Approach to a Rare Injury. Cureus. 2020 Apr 28;12(4):e7865. doi: 10.7759/cureus.7865. PMID: 32489720; PMCID: PMC7255537.

27. Goos JAC, Emmink BL, Nieuwenhuis D, Bosman WM. Hoffa fracture accompanied by dissection of the popliteal artery. BMJ Case Rep. 2019 Dec 8;12(12):e232348. doi: 10.1136/bcr-2019-232348. PMID: 31818893; PMCID: PMC6904177.

28. Ruchelsman DE, Tejwani NC, Kwon YW, Egol KA. Coronal plane partial articular fractures of the distal humerus: current concepts in management. J Am Acad Orthop Surg. 2008 Dec;16(12):716-28. doi: 10.5435/00124635-200812000-00004. PMID: 19056920.

29. Xu Y, Li H, Yang HH. A new fixation method for Hoffa fracture. Eur J Trauma Emerg Surg. 2013 Feb;39(1):87-91. doi: 10.1007/s00068-012-0238-2. Epub 2012 Nov 12. PMID: 26814927.

30. Borse V, Hahnel J, Cohen A. Hoffa fracture: fixation using headless compression screws. Eur J Trauma Emerg Surg. 2010 Oct;36(5):477-9. doi: 10.1007/s00068-010-0014-0. Epub 2010 Apr 27. PMID: 26816229.

31. Peng J, Zhang SL, Feng P, Jiang Y, Zou C, Zhang H, Tu CQ. [A biomechanical comparison of Acutrak headless compression screw and AO cannulated lag screw for the fixation of Hoffa fracture]. Sichuan Da Xue Xue Bao Yi Xue Ban. 2013 Mar;44(2):226-30. Chinese. PMID: 23745261.

32. Cheng PL, Choi SH, Hsu YC. Hoffa fracture: should precautions be taken during fixation and rehabilitation? Hong Kong Med J. 2009 Oct;15(5):385-7. PMID: 19801698.

Declarations

Ethics committee approval and consent to participate

Not required for clinical cases.

Publication consent

The authors have written permission to publish images, radiographs, and photographs deidentified by the patients.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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