

# World Journal of *Clinical Cases*

*World J Clin Cases* 2022 December 26; 10(36): 13148-13469



**MINIREVIEWS**

- 13148** Liver injury in COVID-19: Holds ferritinophagy-mediated ferroptosis accountable  
*Jia FJ, Han J*
- 13157** Amebic liver abscess by *Entamoeba histolytica*  
*Usuda D, Tsuge S, Sakurai R, Kawai K, Matsubara S, Tanaka R, Suzuki M, Takano H, Shimozawa S, Hotchi Y, Tokunaga S, Osugi I, Katou R, Ito S, Mishima K, Kondo A, Mizuno K, Takami H, Komatsu T, Oba J, Nomura T, Sugita M*
- 13167** Living with liver disease in the era of COVID-19-the impact of the epidemic and the threat to high-risk populations  
*Barve P, Choday P, Nguyen A, Ly T, Samreen I, Jhooty S, Umeh CA, Chaudhuri S*
- 13179** Cortical bone trajectory screws in the treatment of lumbar degenerative disc disease in patients with osteoporosis  
*Guo S, Zhu K, Yan MJ, Li XH, Tan J*
- 13189** Probiotics for preventing gestational diabetes in overweight or obese pregnant women: A review  
*Deng YF, Wu LP, Liu YP*

**ORIGINAL ARTICLE****Retrospective Cohort Study**

- 13200** Effectiveness of microwave endometrial ablation combined with hysteroscopic transcervical resection in treating submucous uterine myomas  
*Kakinuma T, Kakinuma K, Shimizu A, Kaneko A, Kagimoto M, Okusa T, Suizu E, Saito K, Matsuda Y, Yanagida K, Takeshima N, Ohwada M*
- 13208** Antibody and complement levels in patients with hypersplenism associated with cirrhotic portal hypertension and therapeutic principles  
*Zhang K, Zeng M, Li YJ, Wu HF, Wu JC, Zhang ZS, Zheng JF, Lv YF*

**Retrospective Study**

- 13216** Case series in Indonesia: B.1.617.2 (delta) variant of SARS-CoV-2 infection after a second dose of vaccine  
*Karuniawati A, Syam AF, Achmadsyah A, Ibrahim F, Rosa Y, Sudarmono P, Fadilah F, Rasmin M*
- 13227** Endobronchial ultrasound-guided transbronchial needle aspiration in intrathoracic lymphadenopathy with extrathoracic malignancy  
*Li SJ, Wu Q*
- 13239** Analysis of the clinical efficacy of two-stage revision surgery in the treatment of periprosthetic joint infection in the knee: A retrospective study  
*Qiao YJ, Li F, Zhang LD, Yu XY, Zhang HQ, Yang WB, Song XY, Xu RL, Zhou SH*

- 13250** Prognostic factors for disease-free survival in postoperative patients with hepatocellular carcinoma and construction of a nomogram model  
*Luo PQ, Ye ZH, Zhang LX, Song ED, Wei ZJ, Xu AM, Lu Z*
- 13264** Oral higher dose prednisolone to prevent stenosis after endoscopic submucosal dissection for early esophageal cancer  
*Zhan SG, Wu BH, Li DF, Yao J, Xu ZL, Zhang DG, Shi RY, Tian YH, Wang LS*
- 13274** Predictive value of the unplanned extubation risk assessment scale in hospitalized patients with tubes  
*Liu K, Liu Z, Li LQ, Zhang M, Deng XX, Zhu H*
- 13284** Classification of rectal cancer according to recurrence types - comparison of Japanese guidelines and Western guidelines  
*Miyakita H, Kamei Y, Chan LF, Okada K, Kayano H, Yamamoto S*
- 13293** Risk of critical limb ischemia in long-term uterine cancer survivors: A population-based study  
*Chen MC, Chang JJ, Chen MF, Wang TY, Huang CE, Lee KD, Chen CY*
- 13304** Serum Spondin-2 expression, tumor invasion, and antitumor immune response in patients with cervical cancer  
*Zhang LL, Lin S, Zhang Y, Yao DM, Du X*
- 13313** Thoracic para-aortic lymph node recurrence in patients with esophageal squamous cell carcinoma: A propensity score-matching analysis  
*Li XY, Huang LS, Yu SH, Xie D*
- 13321** Anastomotic leakage in rectal cancer surgery: Retrospective analysis of risk factors  
*Brisinda G, Chiarello MM, Pepe G, Cariati M, Fico V, Mirco P, Bianchi V*

**META-ANALYSIS**

- 13337** Successful outcomes of unilateral *vs* bilateral pedicle screw fixation for lumbar interbody fusion: A meta-analysis with evidence grading  
*Sun L, Tian AX, Ma JX, Ma XL*

**CASE REPORT**

- 13349** Pregnancy-induced leukocytosis: A case report  
*Wang X, Zhang YY, Xu Y*
- 13356** Acute moderate to severe ulcerative colitis treated by traditional Chinese medicine: A case report  
*Wu B*
- 13364** Solitary hyoid plasmacytoma with unicentric Castleman disease: A case report and review of literature  
*Zhang YH, He YF, Yue H, Zhang YN, Shi L, Jin B, Dong P*
- 13373** Recurrence of intratendinous ganglion due to incomplete excision of satellite lesion in the extensor digitorum brevis tendon: A case report  
*Park JJ, Seok HG, Yan H, Park CH*

- 13381** Two methods of lung biopsy for histological confirmation of acute fibrinous and organizing pneumonia: A case report  
*Liu WJ, Zhou S, Li YX*
- 13388** Application of 3D-printed prosthesis in revision surgery with large inflammatory pseudotumour and extensive bone defect: A case report  
*Wang HP, Wang MY, Lan YP, Tang ZD, Tao QF, Chen CY*
- 13396** Undetected traumatic cardiac herniation like playing hide-and-seek-delayed incidental findings during surgical stabilization of flail chest: A case report  
*Yoon SY, Ye JB, Seok J*
- 13402** Laparoscopic treatment of pyogenic liver abscess caused by fishbone puncture through the stomach wall and into the liver: A case report  
*Kadi A, Tuergan T, Abulaiti Y, Shalayiadang P, Tayier B, Abulizi A, Tuohuti M, Ahan A*
- 13408** Hepatic sinusoidal obstruction syndrome induced by tacrolimus following liver transplantation: Three case reports  
*Jiang JY, Fu Y, Ou YJ, Zhang LD*
- 13418** *Staphylococcus aureus* bacteremia and infective endocarditis in a patient with epidermolytic hyperkeratosis: A case report  
*Chen Y, Chen D, Liu H, Zhang CG, Song LL*
- 13426** Compound heterozygous p.L483P and p.S310G mutations in GBA1 cause type 1 adult Gaucher disease: A case report  
*Wen XL, Wang YZ, Zhang XL, Tu JQ, Zhang ZJ, Liu XX, Lu HY, Hao GP, Wang XH, Yang LH, Zhang RJ*
- 13435** Short-term prone positioning for severe acute respiratory distress syndrome after cardiopulmonary bypass: A case report and literature review  
*Yang JH, Wang S, Gan YX, Feng XY, Niu BL*
- 13443** Congenital nephrogenic diabetes insipidus arginine vasopressin receptor 2 gene mutation at new site: A case report  
*Yang LL, Xu Y, Qiu JL, Zhao QY, Li MM, Shi H*
- 13451** Development of dilated cardiomyopathy with a long latent period followed by viral fulminant myocarditis: A case report  
*Lee SD, Lee HJ, Kim HR, Kang MG, Kim K, Park JR*
- 13458** Hoffa's fracture in a five-year-old child diagnosed and treated with the assistance of arthroscopy: A case report  
*Chen ZH, Wang HF, Wang HY, Li F, Bai XF, Ni JL, Shi ZB*

**LETTER TO THE EDITOR**

- 13467** Precautions before starting tofacitinib in persons with rheumatoid arthritis  
*Swarnakar R, Yadav SL*

**ABOUT COVER**

Editorial Board Member of *World Journal of Clinical Cases*, Janardhan Mydam, MD, Assistant Professor, Consultant Physician-Scientist, Statistician, Division of Neonatology, Department of Pediatrics, John H. Stroger, Jr. Hospital of Cook County 1969 W. Ogden, Chicago, IL 60612, United States. mydamj@gmail.com

**AIMS AND SCOPE**

The primary aim of *World Journal of Clinical Cases (WJCC, World J Clin Cases)* is to provide scholars and readers from various fields of clinical medicine with a platform to publish high-quality clinical research articles and communicate their research findings online.

*WJCC* mainly publishes articles reporting research results and findings obtained in the field of clinical medicine and covering a wide range of topics, including case control studies, retrospective cohort studies, retrospective studies, clinical trials studies, observational studies, prospective studies, randomized controlled trials, randomized clinical trials, systematic reviews, meta-analysis, and case reports.

**INDEXING/ABSTRACTING**

The *WJCC* is now abstracted and indexed in Science Citation Index Expanded (SCIE, also known as SciSearch®), Journal Citation Reports/Science Edition, Current Contents®/Clinical Medicine, PubMed, PubMed Central, Scopus, Reference Citation Analysis, China National Knowledge Infrastructure, China Science and Technology Journal Database, and Superstar Journals Database. The 2022 Edition of Journal Citation Reports® cites the 2021 impact factor (IF) for *WJCC* as 1.534; IF without journal self cites: 1.491; 5-year IF: 1.599; Journal Citation Indicator: 0.28; Ranking: 135 among 172 journals in medicine, general and internal; and Quartile category: Q4. The *WJCC*'s CiteScore for 2021 is 1.2 and Scopus CiteScore rank 2021: General Medicine is 443/826.

**RESPONSIBLE EDITORS FOR THIS ISSUE**

Production Editor: *Ying-Yi Yuan*; Production Department Director: *Xu Guo*; Editorial Office Director: *Jin-Lei Wang*.

**NAME OF JOURNAL**

*World Journal of Clinical Cases*

**ISSN**

ISSN 2307-8960 (online)

**LAUNCH DATE**

April 16, 2013

**FREQUENCY**

Thrice Monthly

**EDITORS-IN-CHIEF**

Bao-Gan Peng, Jerzy Tadeusz Chudek, George Kontogeorgos, Maurizio Serati, Ja Hyeon Ku

**EDITORIAL BOARD MEMBERS**

<https://www.wjgnet.com/2307-8960/editorialboard.htm>

**PUBLICATION DATE**

December 26, 2022

**COPYRIGHT**

© 2022 Baishideng Publishing Group Inc

**INSTRUCTIONS TO AUTHORS**

<https://www.wjgnet.com/bpg/gerinfo/204>

**GUIDELINES FOR ETHICS DOCUMENTS**

<https://www.wjgnet.com/bpg/GerInfo/287>

**GUIDELINES FOR NON-NATIVE SPEAKERS OF ENGLISH**

<https://www.wjgnet.com/bpg/gerinfo/240>

**PUBLICATION ETHICS**

<https://www.wjgnet.com/bpg/GerInfo/288>

**PUBLICATION MISCONDUCT**

<https://www.wjgnet.com/bpg/gerinfo/208>

**ARTICLE PROCESSING CHARGE**

<https://www.wjgnet.com/bpg/gerinfo/242>

**STEPS FOR SUBMITTING MANUSCRIPTS**

<https://www.wjgnet.com/bpg/GerInfo/239>

**ONLINE SUBMISSION**

<https://www.f6publishing.com>

## Hoffa's fracture in a five-year-old child diagnosed and treated with the assistance of arthroscopy: A case report

Zhi-Hao Chen, Hai-Fan Wang, Hao-Yu Wang, Fei Li, Xue-Feng Bai, Jian-Long Ni, Zhi-Bin Shi

**Specialty type:** Anatomy and morphology

**Provenance and peer review:**

Unsolicited article; Externally peer reviewed.

**Peer-review model:** Single blind

**Peer-review report's scientific quality classification**

Grade A (Excellent): 0

Grade B (Very good): B

Grade C (Good): C

Grade D (Fair): 0

Grade E (Poor): 0

**P-Reviewer:** Hakimi T, Afghanistan; Paparoupa M, Germany

**Received:** October 17, 2022

**Peer-review started:** October 17, 2022

**First decision:** October 27, 2022

**Revised:** November 5, 2022

**Accepted:** November 22, 2022

**Article in press:** November 22, 2022

**Published online:** December 26, 2022



**Zhi-Hao Chen, Hai-Fan Wang, Hao-Yu Wang, Fei Li, Jian-Long Ni, Zhi-Bin Shi,** The First Department of Orthopaedics, The Second Affiliated Hospital of Xi'an Jiaotong University, Xi'an Jiaotong University, Xi'an 710004, Shaanxi Province, China

**Xue-Feng Bai,** Department of Orthopaedics, Xi'an Daxing Hospital, Xi'an 710016, Shaanxi Province, China

**Corresponding author:** Zhi-Bin Shi, MD, Professor, The First Department of Orthopaedics, The Second Affiliated Hospital of Xi'an Jiaotong University, Xi'an Jiaotong University, No. 157 Xiwu Road, Xi'an 710004, Shaanxi Province, China. [zbshixjtu@163.com](mailto:zbshixjtu@163.com)

### Abstract

#### BACKGROUND

Hoffa's fracture is a coronal-oriented fracture of the femoral condyle. It is rarely observed in pediatric patients that isolated coronal fracture of the medial femoral condyle accompanies an intact lateral femoral condyle. Only a few cases involving Hoffa's fracture of the medial femoral condyle have been reported in patients with undeveloped skeletons. Such a fracture cannot be observed by routine imaging examinations, thus resulting in possible misdiagnosis and further treatment challenges.

#### CASE SUMMARY

A 5-year-old boy with Hoffa's fracture of the medial femoral condyle suffered from right knee pain and severe swelling after being hit by a heavy object. The patient was misdiagnosed and initially treated in a local primary healthcare center. No improvement in his right knee's extension was observed following conservative treatment for 2 wk. The patient was transferred to our hospital, re-diagnosed using arthroscopy, and underwent open reduction and internal fixation. The therapeutic outcome was satisfactory with the screws removed 7 mo after fixation. At the final follow-up of 40 mo, the range of motion in the knee had recovered. There was no varus-valgus instability.

#### CONCLUSION

Hoffa's fracture is rarely seen in children aged 5 years, let alone in the medial condyle, and can easily be misdiagnosed due to limited physical and imaging examinations. Suspected Hoffa's fracture in preschool children should be confirmed based on arthroscopic findings. Open reduction and internal fixation should be performed to protect the articular surface and prevent long-term complications.

**Key Words:** Hoffa's fracture; Pediatrics; Medial femoral condyle; Missed diagnosis; Arthroscopy; Open reduction-internal fixation; Case report

©The Author(s) 2022. Published by Baishideng Publishing Group Inc. All rights reserved.

**Core Tip:** Hoffa's fracture is a rare fracture pattern of femoral condyle, it has special coronal fracture slice. When it happens in children, this fracture is very easy to be missed. The medial condyle Hoffa's fractures are especially uncommon. We report Hoffa's fracture of the medial condyle in a 5-year-old child, the youngest patient ever reported, who was misdiagnosed in the first place. Eventually, we diagnosed the disease with arthroscopy and completed the operation with its assistance, successfully avoiding the radiation damage caused by computed tomography scans to toddler. Meanwhile, a clear and concise review of literature is also included in our study.

**Citation:** Chen ZH, Wang HF, Wang HY, Li F, Bai XF, Ni JL, Shi ZB. Hoffa's fracture in a five-year-old child diagnosed and treated with the assistance of arthroscopy: A case report. *World J Clin Cases* 2022; 10(36): 13458-13466

**URL:** <https://www.wjgnet.com/2307-8960/full/v10/i36/13458.htm>

**DOI:** <https://dx.doi.org/10.12998/wjcc.v10.i36.13458>

## INTRODUCTION

Hoffa's fracture, named after Albert Hoffa in 1904 following his detailed research on this disease[1], is an unusual fracture type on the coronal plane of the femoral condyle. Hoffa's fractures of the lateral femoral condyle are commonly seen, while Hoffa's fractures of the medial femoral condyle are rare, especially in individuals with undeveloped skeletons. The latest case was a 16-year-old girl with Hoffa's fracture of the medial femoral condyle reported by Jiang *et al*[2] in 2022. This type of fracture is an intra-articular fracture and is clinically treated under the same principles as a typical intra-articular fracture. But this type of injury is often misdiagnosed due to a lack of clinical suspicion and radiographic examinations. In this report, we present the case of a 5-year-old boy with unusual type of injury misdiagnosed in a local hospital. Arthroscopy was performed to confirm the medial Hoffa's fracture. Later, open reduction and internal fixation were successfully applied to the patient for treatment.

## CASE PRESENTATION

### Chief complaints

A 5-year-old boy was transferred to the Department of Orthopedics in our hospital due to right knee pain and swelling, and an inability to bear weight and extend the right knee.

### History of present illness

The patient had right knee pain and an inability to extend the knee following 2 weeks of conservative treatment.

### History of past illness

The boy had no history of severe diseases, surgery or long-term medication.

### Personal and family history

The patient's family had no related diseases.

### Physical examination

His right knee was swollen, skin was intact with tenderness on palpation, and limited mobility. No distal neurovascular deficits were observed. He was alert, articulate, and a reliable reporter. No other weakness, stiffness, or edema was found.

### Laboratory examinations

Results of laboratory examinations were unremarkable.

### Imaging examinations

X-Ray showed a stable fracture in the medial femoral condyle with no displacement (Figure 1). A local orthopedist suggested conservative treatment. Computed tomography (CT) is considered efficient in the diagnosis of adult Hoffa's fracture. However, in this case, the thick cartilage of the distal femoral epiphyseal area made it difficult to evaluate the fracture[1,3,4]. The area of high signal on magnetic resonance imaging (MRI) also indicated no severe displacement (Figure 2).

---

### FURTHER DIAGNOSTIC WORK-UP

Arthroscopy was performed to confirm the diagnosis. Different from the findings on the imaging examinations, obvious fracture displacement of the cartilage was found (Figure 3).

---

### FINAL DIAGNOSIS

Hoffa's fracture of the medial femoral condyle.

---

### TREATMENT

Arthroscopic exploration and diagnosis were performed at the beginning of the operation. The presence of steps and micromovement at the fracture ends could be seen during arthroscopy. However, due to instability of the bone mass caused by the now old injury (more than 2 wk), it was difficult to achieve a satisfactory reduction *via* arthroscopy. Therefore, open reduction was scheduled (Figure 4). Two 3.0 mm partially-threaded cancellous screws placed perpendicular to the fracture line were used to reduce the fracture. To avoid epiphyseal injury, a screw of appropriate length was placed through the metaphysis. Countersunk screws were also placed through the articular cartilage.

---

### OUTCOME AND FOLLOW-UP

Following open reduction and internal fixation, the patient wore a knee brace with 30° of knee flexion for approximately 2 wk. Afterwards, gradually begin to work on the range of motion of the knee. The patient was strictly instructed to avoid any weight-bearing bending until the sixth week, in order to minimize the shear force on his coronation. Partial weight-bearing began after the sixth week, then progressing to full weight-bearing (FWB) by the tenth week. At the six-month follow-up, he could walk without support. The knee range of motion was 5° to 100° (Figure 5). No angular deformity or limb-length discrepancy was observed. X-ray showed that the fracture healed well and there was no sign of femoral condyle collapse (Figure 6). The screws were removed after 7 mo. At the final follow-up of 40 mo, the KSS score was 100. The patient had full range of motion, with no varus-valgus instability (Figure 7).

---

### DISCUSSION

Coronal plane fracture of the femoral condyle was named after Hoffa following his detailed research on this fracture in 1904[3]. Letenneur *et al*[5] classified this fracture into three different types. Accordingly, our patient developed a Type III fracture. This rare injury can also be classified into a medial, lateral and conjoint Hoffa's fracture based on the location of the fracture[6]. According to a review of the literature on Hoffa's fracture in the pediatric population (Table 1), 16 cases of Hoffa's fracture in pediatric patients were reported. Only 5 were located on the medial femoral condyle. Bali *et al*[7] first described an isolated Hoffa's fracture of the medial condyle in a patient with an undeveloped skeleton. Ranjan *et al*[6] described a Hoffa's fracture of the medial condyle in a 6-year-old girl. To date, only four cases of Hoffa's fracture of the medial condyle in pediatric patients has been reported. We aimed to report the fifth case in a 5-year-old patient, the youngest ever diagnosed.

Hoffa's fractures are mostly triggered by high-energy damage[8,9], and are more commonly seen in young adults. This injury is mainly caused by axial shear force affecting the posterior part of the femoral condyle when the knee is flexed[6]. Due to the anatomical features of the ectropion angle at the distal femur, when high-energy violence acts on the distal femur, it often acts firstly on the lateral condyle. As a result, lateral condyle fractures are more common than medial condyle fractures. Commonly, the cause of Hoffa's fractures in adults is vehicle accidents[7] while in pediatric Hoffa's fracture are usually caused by trivial injury or sports injury[10]. In this case, the injury was caused by a heavy object falling

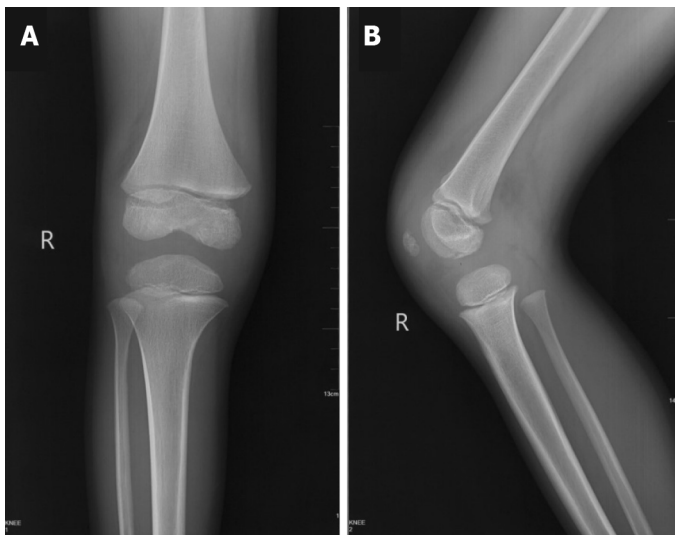


Table 1 Review of the literature on Hoffa's fracture in the pediatric population

No.	Ref.	Sex	Age (yr)	Injury	Diagnostic tool	Location of fracture	Approach	Outcome
1	Agrawal <i>et al</i> [8], 2021	M	18	Road side accident	X-ray, CT	Conjoint	Medial parapatellar approach, with 2 (6.5 mm) PTCS in 1 condyle and one 6.5 and 4.5 mm PTCS in another condyle	0°-130° ROM
2	Kondreddi <i>et al</i> [9], 2014	-	17	Road traffic accident	X-ray		Lateral parapatellar arthrotomy, with four 4-mm cancellous screws (2 for each condyle) introduced antero-posteriorly through the non-articular surface, in a direction perpendicular to the fracture line	120° ROM
3	Julfiqar <i>et al</i> [20], 2019	M	12	Fall from height when his left knee was in the flexed position	X-ray		Open reduction and intraepiphyseal internal fixation using a 4.5 mm cannulated cancellous screw	0°-120° ROM
4	Chaudhary <i>et al</i> [12], 2020	M	11	Fall from a tree	X-ray		Open reduction and internal fixation using the Swashbuckler approach, lag screw technique with two 4 mm cancellous screws placed antero-posteriorly in the lateral condyle and one antero-posterior 4 mm cancellous screw and one Herbert screw placed postero-anteriorly in the medial condyle	0°-120° ROM
5	Lal <i>et al</i> [15], 2011	-	9	Fall from height	X-ray		Arthroscopy assisted internal fixation, with 4.5-mm cannulated cancellous screws, inserted from anterior to posterior just distal to the femoral physis	Cure
6	Harna <i>et al</i> [22], 2017	M	7	Hit by a speeding motor vehicle	CT		Swashbuckler approach, with 2.9 mm Herbert screws for compression	0°-130° ROM
7	Kumar <i>et al</i> [13], 2001	F	17	Fall from ladder	X-ray	Lateral femoral condyle	Reduction and fixation with two antero-posterior lag screws	Full ROM
8	Flanagin <i>et al</i> [10], 2011	M	14	Wrestling	Arthroscopy		Headless compression screws	Full ROM
9	Potini <i>et al</i> [14], 2015	M	14	Direct blow over knee	X-ray		Open reduction and rigid fixation with countersunk interfragmentary screws	5°-110° ROM
10	Tripathy <i>et al</i> [19], 2013	M	12	Fall while playing	CT		Open reduction and fixation with two partially threaded cancellous lag screws	Cure
11	Ashraf[16], 2019	M	12	Motor vehicle accident	X-ray, CT		Evaluation of the cruciateligaments and antero-posterior stability with arthroscopy, open reduction and internal fixation using two cannulated screws	Full ROM
12	McDonough <i>et al</i> [11], 2000	M	8	Road traffic accident	X-ray		Open reduction and internal fixation using two partially threaded cancellous lag screws	Full ROM
13	Jiang <i>et al</i> [2], 2022	F	16	Knee injury in a sprint race	X-ray, CT	Medial femoral condyle	Open reduction and fixation using three 3.5 mm partially threaded cancellous screws	0°-135° ROM
14	AlKhalife <i>et al</i> [3], 2018	M	12	Object dropped	CT		Open reduction and internal fixation through a medial parapatellar approach with the aid of a bone clamp and two 4.0 mm partially threaded cancellous screws, the screw heads placed through the articular cartilage were countersunk	15°-130° ROM
15	Bali <i>et al</i> [7], 2011	M	12	Traffic accident	CT		Open reduction and internal fixation with two large-fragment cannulated screws, which were buried under the articular surface of the knee	Cure
16	Ranjan <i>et al</i> [6], 2021	F	6	Fall	CT		Open reduction and fixation through the medial approach with two 4.5 mm partially threaded cannulated cancellous screws	0°-110° ROM
17	Current Study, 2022	M	5	Hit by object	Arthroscopy		Open reduction and internal fixation through the medial parapatellar approach, using two 3.0 mm partially threaded cancellous screws	Full ROM

CT: Computed tomography; PTCS: Partially threaded cannulated cancellous screws; ROM: Range of motion.

on the right knee. Since only a few cases have been reported, little is known about Hoffa's fractures in children, and McDonough *et al*[11] reported the first case of a non-healing Hoffa's fracture in an eight-year-old boy. According to our research (Table 1), X-ray is the most effective diagnostic tool for confirming pediatric Hoffa's fracture, followed by CT[12-14]. However, as the fracture is barely visible



DOI: 10.12998/wjcc.v10.i36.13458 Copyright ©The Author(s) 2022.

**Figure 1 X-ray before surgery shows a stable fracture in the medial femoral condyle with no displacement.** A: Anterior-posterior view of X-ray; B: Lateral view of X-ray.



DOI: 10.12998/wjcc.v10.i36.13458 Copyright ©The Author(s) 2022.

**Figure 2 Magnetic resonance imaging before surgery indicated no severe displacement.** A: Sagittal slice of lateral condyle of femur; B: Most lateral slice of femoral intercondylar notch; C: Most medial slice of femoral intercondylar notch; D: Sagittal slice of medial condyle of femur.

on routine anteroposterior radiographs, misdiagnosis often occurs even in the lateral view. The fracture can be obscured by the intact anterior condyle in the anterior and posterior projections, if it is minimally displaced[15-17]. Therefore, it is wiser to carry out the gold standard investigation, which is CT[18]. However, in pediatric patients, the fracture line can be easily ignored, even on CT and MRI due to thick cartilage. In young patients, the diagnosis of Hoffa's fracture is often omitted based on past clinical experience. Three cases of misdiagnosed Hoffa's fracture in eight-year-old and two twelve-year-old boys were identified in previous literature, which were fixed with cannulated screws and successfully treated[11,16,19]. In this study, we report another case of nonunion of Hoffa's fracture in the medial condyle in a five-year-old boy who was initially misdiagnosed as having a stable fracture with no displacement. The patient was finally diagnosed with Hoffa's fracture by arthroscopy. Therefore, it is noteworthy that arthroscopy is critical in the diagnosis of pediatric Hoffa's fracture with inconclusive radiographs[10]. In our case, a CT scan was not performed on the injured knee due to difficulty in



DOI: 10.12998/wjcc.v10.i36.13458 Copyright ©The Author(s) 2022.

Figure 3 Arthroscopy showed obvious fracture displacement of the cartilage.

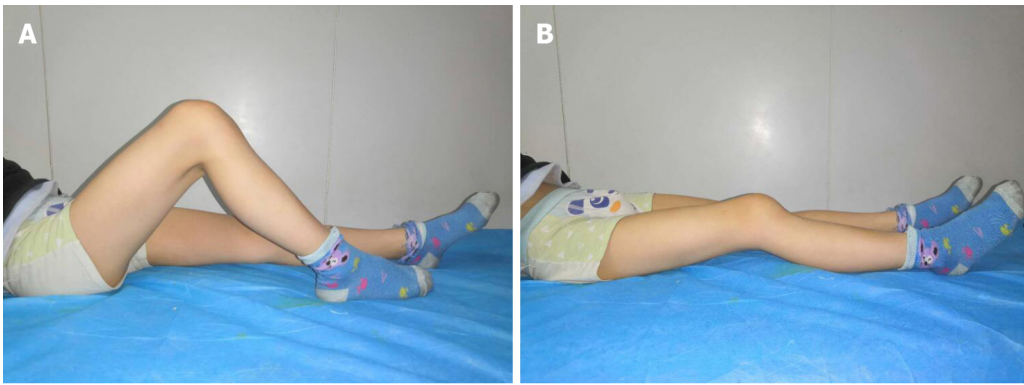


DOI: 10.12998/wjcc.v10.i36.13458 Copyright ©The Author(s) 2022.

Figure 4 The operation was completed using the medial parapatellar approach.

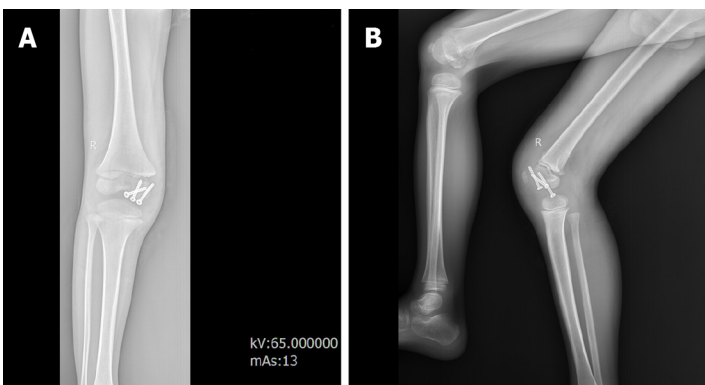
evaluating the fracture, thick cartilage of the distal femoral epiphysis and the patient's immature skeleton[1,3,4]. Avoiding CT exams can also prevent greater radiation exposure during CT scans than X-rays[20].

Conservative treatment of these fractures is unsatisfactory as the reduction in fracture fragments is difficult to achieve and to maintain by closure. This may lead to multiple complications such as avascular necrosis, nonunion, and malunion[4,15,21]. Therefore, as the ideal treatment[19], surgical stabilization and internal fixation are required to achieve a satisfactory clinical outcome. There is also controversy regarding the surgical approaches for pediatric Hoffa's fracture. The approaches described in previous literature include the lateral, medial and Swashbuckler approach (Table 1). It is generally accepted that surgical stabilization is necessary for a satisfactory clinical outcome after the treatment of Hoffa's fracture. The reason for this is that, closure reduction and cast/traction techniques are difficult to achieve and sustain the reduction of fracture fragments without soft tissue attachment. Therefore, this kind of injury is also prone to vascular necrosis and bone nonunion, which should be prevented by stable anatomical compression reduction and internal fixation. This can only be achieved by open/arthroscopic approaches[15]. In our case, we performed open reduction and internal fixation with the assistance of arthroscopy using a medial parapatellar approach. The outcome was satisfactory. The advantages of the guidance of arthroscopy include avoidance of soft tissue, decreased blood loss, and intraarticular visualization. Acute Hoffa's fracture with minimal comminution and large fragments can also get benefit from arthroscopic fixation[21,22].



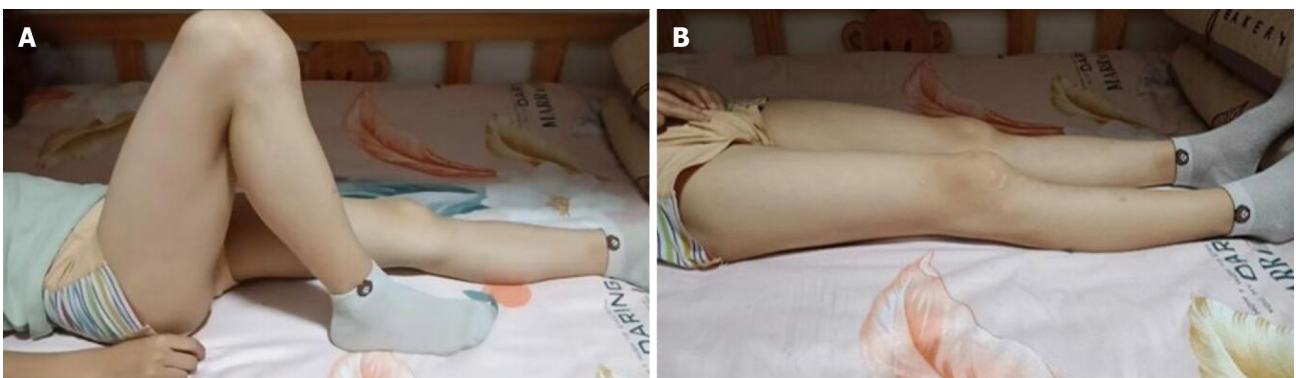
DOI: 10.12998/wjcc.v10.i36.13458 Copyright ©The Author(s) 2022.

**Figure 5** Six months after surgery, the range of motion of the knee joint reached 5°-100°. A: Maximum flexion position; B: Maximum extension position.



DOI: 10.12998/wjcc.v10.i36.13458 Copyright ©The Author(s) 2022.

**Figure 6** Plain radiographs showed a well-healed fracture with no evidence of collapse of the femoral condyle. A: Anterior-posterior view of X-ray; B: Lateral view of X-ray.



DOI: 10.12998/wjcc.v10.i36.13458 Copyright ©The Author(s) 2022.

**Figure 7** At the final follow-up of 40 months, the patient had full range of motion. A: Maximum flexion position; B: Maximum extension position

## CONCLUSION

We report Hoffa's fracture of the medial condyle in a 5-year-old child, the youngest patient ever reported, who was diagnosed and treated with the assistance of arthroscopy. We maintain that this rare fracture can be misdiagnosed easily. Healthcare practitioners should note of this when dealing with children's knee fractures. It is better to diagnose this fracture by arthroscopy in patients with skeletal immaturity. Treatment of this fracture with open reduction and internal fixation can prevent further long-term complications. However, arthroscopy-guided reduction and internal fixation may be a good option for patients who have a fresh fracture.

## FOOTNOTES

**Author contributions:** Shi ZB provided this case and provided the relevant fund; Chen ZH and Wang HF drafted the majority of the manuscript; Wang HY, Li F, Bai XF and Ni JL collected all the materials; All authors have read and approved the final version.

**Informed consent statement:** Informed written consent was obtained from the patient.

**Conflict-of-interest statement:** All the authors declare that they have no conflict of interest.

**CARE Checklist (2016) statement:** The authors have read the CARE Checklist (2016), and the manuscript was prepared and revised according to the CARE Checklist (2016).

**Open-Access:** This article is an open-access article that was selected by an in-house editor and fully peer-reviewed by external reviewers. It is distributed in accordance with the Creative Commons Attribution NonCommercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited and the use is non-commercial. See: <https://creativecommons.org/licenses/by-nc/4.0/>

**Country/Territory of origin:** China

**ORCID number:** Zhi-Hao Chen 0000-0002-7499-7507; Fei Li 0000-0002-7282-1938; Zhi-Bin Shi 0000-0002-4488-080X.

**S-Editor:** Liu JH

**L-Editor:** A

**P-Editor:** Liu JH

## REFERENCES

- Hoffa A. Lehrbuch der Frakturen und Luxationen. Stuttgart: Verlag von Ferdinand Enke. 1904; 451. Available from: <https://www.abebooks.fr/Lehrbuch-Frakturen-Luxationen-Hoffa-Albert/30696933697/bd>
- Jiang ZX, Wang P, Ye SX, Xie XP, Wang CX, Wang Y. Hoffa's fracture in an adolescent treated with an innovative surgical procedure: A case report. *World J Clin Cases* 2022; **10**: 1410-1416 [PMID: 35211577 DOI: 10.12998/wjcc.v10.i4.1410]
- AlKhalife YI, Alshammari AN, Abouelnaga MA. Hoffa's fracture of the medial femoral condyle in a child treated with open reduction and internal fixation: A case report. *Trauma Case Rep* 2018; **14**: 20-26 [PMID: 29644303 DOI: 10.1016/j.tcr.2018.01.002]
- Lewis SL, Pozo JL, Muirhead-Allwood WF. Coronal fractures of the lateral femoral condyle. *J Bone Joint Surg Br* 1989; **71**: 118-120 [PMID: 2914979 DOI: 10.1302/0301-620X.71B1.2914979]
- Letenneur J, Labour PE, Rogez JM, Lignon J, Bainvel JV. [Hoffa's fractures. Report of 20 cases (author's transl)]. *Ann Chir* 1978; **32**: 213-219 [PMID: 697301]
- Ranjan R, Kumar R, Jeyaraman M, Jain R, Chaudhary D, Kumar S. Hoffa Fracture in Skeletally Immature Patients: A Case Report and Review of Literature. *J Orthop Case Rep* 2021; **11**: 112-118 [PMID: 34141684 DOI: 10.13107/jocr.2021.v11.i02.2050]
- Bali K, Mootha AK, Prabhakar S, Dhillon MS. Isolated Hoffa fracture of the medial femoral condyle in a skeletally immature patient. *Bull NYU Hosp Jt Dis* 2011; **69**: 335-338 [PMID: 22196392]
- Agrawal P, Kumar A, Teja KVC, Razeq MRA. A Case Report of Adolescent Bicondylar Conjoint Hoffa Fracture with Patellar Fracture and Dislocation: A Rare Combination. *J Orthop Case Rep* 2021; **11**: 57-61 [PMID: 35415153 DOI: 10.13107/jocr.2021.v11.i12.2566]
- Kondreddi V, Yalamanchili RK, Ravi Kiran K. Bicondylar Hoffa's fracture with patellar dislocation - a rare case. *J Clin Orthop Trauma* 2014; **5**: 38-41 [PMID: 25983467 DOI: 10.1016/j.jcot.2014.02.001]
- Flanagan BA, Cruz AI, Medvecky MJ. Hoffa fracture in a 14-year-old. *Orthopedics* 2011; **34**: 138 [PMID: 21323278 DOI: 10.3928/01477447-20101221-30]
- McDonough PW, Bernstein RM. Nonunion of a Hoffa fracture in a child. *J Orthop Trauma* 2000; **14**: 519-521 [PMID: 11083619 DOI: 10.1097/00005131-200009000-00013]
- Chaudhary SD, Raghuvanshi SR. Complex Variant of Paediatric Conjoint Bicondylar Hoffa Fracture: A Rare Entity. *Indian J Orthop* 2020; **54**: 408-411 [PMID: 33194112 DOI: 10.1007/s43465-020-00240-1]
- Kumar R, Malhotra R. The Hoffa fracture: Three case reports. *J Orthop Surg (Hong Kong)* 2001; **9**: 47-51 [PMID: 12118131 DOI: 10.1177/230949900100900210]
- Potini VC, Gehrmann RM. Intra-Articular Dislocation of the Patella With Associated Hoffa Fracture in a Skeletally Immature Patient. *Am J Orthop (Belle Mead NJ)* 2015; **44**: E195-E198 [PMID: 26047005]
- Lal H, Bansal P, Khare R, Mittal D. Conjoint bicondylar Hoffa fracture in a child: a rare variant treated by minimally invasive approach. *J Orthop Traumatol* 2011; **12**: 111-114 [PMID: 21509543 DOI: 10.1007/s10195-011-0133-3]
- Ashraf E. Missed Hoffa Fracture in Skeletally Immature Patient Complicated by Non-union Pseudoarthrosis: Case Report and Review of Literature. *Ortho & Rheum Open Access J* 2019; **15**: 555916 [DOI: 10.19080/OROAJ.2019.15.555916]
- Allmann KH, Althoefer C, Wildanger G, Gufler H, Uhl M, Seif el Nasr M, Langer M. Hoffa fracture--a radiologic diagnostic approach. *J Belge Radiol* 1996; **79**: 201-202 [PMID: 8958668]

- 18 **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; **96**: 49-54 [PMID: 21904943 DOI: 10.1007/s12306-011-0165-0]
- 19 **Tripathy SK**, Aggarwal A, Patel S, Goyal T, Priya N. Neglected Hoffa fracture in a child. *J Pediatr Orthop B* 2013; **22**: 339-343 [PMID: 22643129 DOI: 10.1097/BPB.0b013e328354f6e2]
- 20 **Julfiqar**, Huda N, Pant A. Paediatric conjoint bicondylar Hoffa fracture with patellar tendon injury: An unusual pattern of injury. *Chin J Traumatol* 2019; **22**: 246-248 [PMID: 31230844 DOI: 10.1016/j.cjtee.2018.08.008]
- 21 **Holmes SM**, Bomback D, Baumgaertner MR. Coronal fractures of the femoral condyle: a brief report of five cases. *J Orthop Trauma* 2004; **18**: 316-319 [PMID: 15105756 DOI: 10.1097/00005131-200405000-00010]
- 22 **Harna B**, Goel A, Singh P, Sabat D. Pediatric conjoint Hoffa's fracture: An uncommon injury and review of literature. *J Clin Orthop Trauma* 2017; **8**: 353-354 [PMID: 29062218 DOI: 10.1016/j.jcot.2016.12.001]



Published by **Baishideng Publishing Group Inc**  
7041 Koll Center Parkway, Suite 160, Pleasanton, CA 94566, USA  
**Telephone:** +1-925-3991568  
**E-mail:** [bpgoffice@wjgnet.com](mailto:bpgoffice@wjgnet.com)  
**Help Desk:** <https://www.f6publishing.com/helpdesk>  
<https://www.wjgnet.com>

