Is femoral head fracture-dislocation management improvable: A retrospective study in 110 cases


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Summary

Introduction: There is no established consensus on the diagnosis and treatment of traumatic fracture-dislocation of the femoral head — largely due to the rarity of this injury.
Hypothesis: Analysis of a large series of fracture-dislocations of the femoral head using a single coherent classification should enable the means of diagnosis and treatment of fracture-dislocations of the femoral head to be specified.
Objectives: The hypothesis was tested by analyzing a retrospective series of 110 patients charts admitted between 1972 and 2008, using Pipkin’s classification and an alternative new one, Chiron’s classification.
Material and methods: The series comprised 21 women and 89 men; mean age: 37.1 years. Dislocation was posterior in 102 cases and anterior in eight. Associated lesions comprised 46 fractures of the acetabulum and four of the femoral neck. Classification following Pipkin and Chiron was based on double reading of radiology documents from 102 patients. Treatment was exclusively conservative in 32 cases, and surgical in 78, with 51 posterior, 19 anterior and four medial approaches and four arthroscopic procedures. Surgery comprised osteosynthesis of the femoral head in 30 cases and of the acetabulum in 16, removal of fragments in 40 cases and total hip replacement (THR) in five cases as a primary treatment.
Results: Mean follow-up was 37 months. THR was performed in 25 cases: five as a primary treatment and 20 secondarily, 15 of which were performed within the first 6 months. Significant predictive factors for THR were: old age, Chiron grade 3, and femoral neck fracture. The THR and non-THR groups differed on the Chiron but not on the Pipkin classification at the time of the injury. Specific treatments were not predictive of evolution. Fragment removal was more often by a posterior than an anterior or medial approach.

Conclusion: The Chiron classification showed prognostic value for evolution to THR; to be reproducible, it needs to be based on CT data. No particular mode of treatment emerged as preferable. Better initial lesion analysis should enable prognosis and target indications.

Level of evidence: Level IV Retrospective study.

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Introduction

Fracture of the femoral head is a complication found in 6 to 15% of cases of traumatic hip dislocation [1—10], most often in posterior but also in anterior dislocation [11,12]. It worsens the prognosis for the dislocation, with spontaneous evolution to osteoarthritis in more than 50% of cases [5].

Initial reports sought to classify lesions [13—17]. Separated osteochondral fragment associated with round ligament avulsion is easily identified, and is now systematically screened for on post-reduction CT. Descriptive classifications, however, are of little prognostic value. Pipkin III femoral neck fracture is associated with poor prognosis [18,19]. In his grade-IV femoral head fracture in the weight-bearing area, Yoon recommends total hip replacement (THR) as a primary treatment [17]. Femoral head lesions may be limited to cartilage impaction without true fracture separation [20], or to mere change in subchondral signal on MRI [21]: more recent classifications take account of this aspect of osteochondral lesions [22,23].

Management of femoral head fractures remains controversial. In conservative surgery, there is discussion as to whether the approach should be anterior, posterior or medial [5,24—29]. There is also no consensus as to whether the procedure itself should consist in removal or osteosynthesis. THR in first intention is recommended in lesions involving femoral neck fracture in elderly patients. Arthroscopy has yet to find its place in the therapeutic arsenal [30,31].

Prognosis remains uncertain, due to diagnostic problems and the small number of cases reported in the literature. We therefore studied a large series, using a new and more prognostic classification.

The study used two classifications, the classic Pipkin system, and Chiron’s more modern one, assessing their reproducibility and prognostic value. The aim was to determine the relevance of our new classification and assess lesion evolution according to initial diagnosis and treatment modality.

Patient and methods

Patients

This was a retrospective study of 110 patients, included on the basis of spontaneous declaration by orthopedic surgeons working in France, members of the trauma study group, groupe d'étude des traumatismes (GETRAUM).

The inclusion criterion was hip dislocation with associated fracture of the head of the femur. The one exclusion criterion was lack of preoperative X-ray assessment data enabling classification. CT scans were not mandatory, given the dates of some clinical cases in this retrospective study.

For each patient, the usual epidemiological items (age, gender) were recorded. General health status at time of trauma was scored on the American Society of Anesthesiology (ASA) system. Trauma type and mechanism, the work-accident status of the trauma, and the patient’s smoking status were also recorded.

Time to treatment, whether surgical or definitively orthopedic (days), and heavy traction time were recorded. In case of surgery, the approach (posterior, anterior, medial or double anteromedial) was recorded as was any associated trochanteric osteotomy [23]. Surgical procedure was recorded as fragment removal, osteotomy or first-intention THR; in case of osteosynthesis, implant material was recorded. Immediate postoperative course data comprised time to weight-bearing (days), rehabilitation center stay (days), onset of infection or disassembly, and any unexpected event.

Lesion description

Initial lesions were described, including associated dislocation site where appropriate: anterior, posterior, pubic, obturatory, iliac or ischial.

Femoral head lesions were classified following both Pipkin and Chiron. The Pipkin classification (Fig. 1) comprises four grades [15]:

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Fracture-dislocation of the femoral head

- grade 1: fracture separating an inferior fragment not extending beyond the round ligament insertion area;
- grade 2: fracture separating a fragment including cartilage from the weight-bearing area above the round ligament insertion;
- grade 3: fracture of the femoral neck associated with fracture separation of the head;
- grade 4: fracture of the acetabulum associated with fracture separation of the femoral head.

Chiron’s classification comprises five grades (Fig. 2) according to head fragment size:

- grade 1: 1 or more anteroinferior osteochondral fragments;
- grade 2: separation of an anterior fragment of a sagittal cross-section surface equal to a quarter of the femoral head, with a line passing below the round ligament insertion;
- grade 3: separation of a third of the sagittal cross-section surface of the head, with a line passing above the round ligament insertion (as in the clinical case presented in Fig. 3A and B).
- grade 4: half of the head separated;
- grade 5: comminutive fracture impaction in the weight-bearing area of the femoral head.

These five grades are further subdivided as: A, if isolated; B, in case of associated acetabular fracture (usually of the posterior wall); or C, in case of femoral neck fracture.

Classification reproducibility

Each patient was scored on the Pipkin and Chiron classifications by two designated independent expert surgeons, blind to one another’s scores. The reference grading for the series was then agreed upon between the two.

Assessment

The principal failure criterion was THR as outcome parameter. Files not specifying THR status were excluded from analysis, except for their preoperative diagnostic data and information on choice of treatment. A minimum follow-up threshold was set at 6 months for the non-THR group. The first-intention THR subgroup was distinguished in the statistical search for factors predictive of failure.

Onset of complications was explored: infection, or aseptic osteonecrosis of the femoral head; onset of periarticular...
Figure 3  Farming injury in a 57-year-old man. A. Posterior left hip dislocation with fracture of the femoral head. CT scan with 3D view. B. Coronal reconstruction of the hip after reduction. Pipkin grade 1, Chiron 3A. C. Anterior Huerter approach with dislocation in external rotation: extension and fixation with two 3.5 mm diameter screws. D. Radiological result at 6 months’ follow-up. The patient was back to work with PMA score at 5/4/5.

calcification was not investigated, as imaging files did not include any end-of-FU radiography enabling such analysis. Any secondary surgery was recorded as: removal of material, revision for infection, conservative debridement of the hip, or THR. The interval (months) between initial treatment and secondary THR was recorded. Pain, where present, at last FU in the non-THR group or immediately prior to THR in the THR group was scored on a self-administered visual analog scale (VAS). Stiffness at last FU in the non-THR group or immediately prior to THR in the THR group was investigated by asking the patient’s surgeon to describe sectors of hip stiffness (flexion—extension, abduction—adduction, external—internal rotation) and to specify any limitation of range of motion (ROM). Return to sport and work was recorded at end of follow-up.

Results

Epidemiological data

One hundred and ten cases of femoral head fracture were included, from the Amiens (14 cases), Annecy (two cases), Besançon (nine cases), Bordeaux (one case), Lille (two cases), Niort (three cases), Orléans (three cases), Grenoble (14 cases), Saint-Jean-de-Maurienne (three cases), Thonon-les-Bains (one case), Toulon (six cases) and Toulouse (52 cases) centers.

The retrospective inclusion period was of 16 years (December 1972 to April 2008). There were 21 women and 89 men; mean age, 37.1 years (range, 13—90 yrs). Mean ASA score was 1.28 (range, 1–3). Thirty-three patients (30%) were classified as smokers. All patients presented with traumatic femoral head fracture: 90 road accidents, including 52 car drivers, 18 motorcyclists, two cyclists, one truck driver and 17 not specified; 11 sports accidents (skiing, rugby, quad driving, horse-riding); four home accidents; and five not specified. There were nine work accidents. Seventy-three cases involved high-energy trauma.

Diagnosis

Image-based diagnostic analysis was possible for 102 files, the other eight lacking sufficient imagery for classification. CT scans were available in 84 cases (76% of the 110 files, or 82% of the 102 files analyzed). Dislocation was posterior in 102 cases: 65 iliac, seven ischial and 30 non-classified posterior dislocations. There were eight anterior dislocations: five pubic, two obturatory and one non-classified. Associated hip lesions comprised 46 acetabular and four femoral neck fractures; there were 18 cases of multiple traumas with severe visceral lesions. Twenty-five patients required intensive care. Eighty-three patients showed associated osteoarticular lesions of the trunk and limbs.

Pipkin classification was feasible in 102 files after reading by two independent experts, with a kappa concordance coefficient of 0.87, considered excellent [30]. Table 1 shows the distribution of Pipkin grades. The Chiron numeric classification was feasible in 102 files after double reading, with a kappa concordance coefficient of 0.68, considered good [32]; alphabetic Chiron classification was feasible in 102 files, with a kappa concordance coefficient of 0.85, considered good [32]. Table 2 shows the distribution of Chiron grades.

Treatment

Mean time to treatment was 4.31 days (range, 0–45 days). In all cases, treatment began with emergency reduction (within 6 hours) under general anesthesia. Traction was implemented in 77 patients, for a mean 18.5 days.

Non-surgical treatment was performed in 32 cases: early mobilization without traction (six cases), or more than 5 days’ traction (26 cases) for a mean 28 days (range, 2–45 days). Chi² independence testing did not find any Pipkin or Chiron grade particularly associated with orthopedic management (p > 0.05).
Surgical treatment was performed in 78 cases; the approach was posterior in 51 cases, anterior in 19 and medial in four, and there were four arthroscopies (Fig. 4). Fragment removal was performed in 40 cases. Osteosynthesis of the femoral head was performed in 30 cases, using either resorbable screws (four cases) or 3.5–4 mm (24 cases; see Fig. 3) or 6.5 mm screws (one case) or K-wires (one case). Acetabular osteosynthesis was performed in 16 cases, of which three were isolated, without femoral head surgery (Tables 1 and 2). First-intention THR was performed in five cases, with a posterior approach; Tables 1 and 2 show lesion grades for first-intention THR. Arthroscopy was performed in four cases, for fragment removal, and associating percutaneous screwing in one case. Fragment removal was performed in 25 of the 40 cases with a posterior approach (significant on Chi²: \( p = 0.01 \)). Performance of osteosynthesis was not significantly associated with approach (posterior, anterior or medial (Chi² test: \( p > 0.05 \)). All 16 acetabular osteosyntheses used a posterior approach (Chi² test: \( p < 0.05 \)). The distribution of treatment attitudes regarding the femoral head fracture evolved over the study period (1972–2008): a) in the 23 patients of the 1989–98 period, orthopedic treatment was applied in 26% of cases, fragment

Figure 4  Patients with and without THR at end of follow-up per type of treatment.
removal in 41%, osteosynthesis in 23% and first-intention THR in 10%; b) in the 63 patients of the 1999–2008 period, orthopedic treatment was applied in 32% of cases, fragment removal in 35%, osteosynthesis in 32% and first-intention THR in 1%.

Tables 1 and 2 show treatment attitudes according to Pipkin and Chiron lesion grade, the classifications being those of the consensus between the two readers for the 102 cases analyzed; the remaining eight cases kept the Pipkin and Chiron grade attributed by the center in question. In the Pipkin 1/Chiron 2A or 3A subgroup (i.e., fragment below the weight-bearing surface), orthopedic management was implemented in 15 cases, removal in 10, and osteosynthesis in 11; only one first-intention THR was performed in this subgroup.

In the postoperative course, progressive resumption of weight-bearing took a mean 60 days (range, 0–135 days). Two patients had postoperative infection, following secondary THR, at 15 days and 4 months post-trauma respectively, following initial fragment removal on respectively an anterior and a posterior approach.

Results at end of follow-up

Ninety-two of the 110 patients (84%) were followed up; 18 were lost to follow-up in the sense that information was lacking regarding end-of-FU THR status. Mean FU was 38 months (range, 3–20 mo; SD, 45 mo; median 24 mo). The shortest follow-ups (3–6 months) were for three first-intention THR patients; their files were included in analysis, being complete with respect to the main end-of-FU failure criterion: THR. There were eight cases of aseptic osteonecrosis of the femoral head (8%). Osteosynthesis material was removed in 6% of patients followed up. Seventy-eight percent had resumed work and 38% sport. Seventy-eight percent had resumed work and 38% sport.

Epidemiological analysis of the groups with and without THR revealed no significant differences except for greater age in case of THR (Student; \( p = 0.01 \) (Table 3)).

Taking the groups without secondary THR (non-THR group, \( n = 67 \)) and with strictly secondary THR (THR group, \( n = 20 \)), eliminating the five cases of first-intention THR, enables analysis of the impact of initial treatment on failure (secondary THR). Orthopedic management was not more strongly associated with failure than surgical treatment on Chi2: 28% initial orthopedic management in the non-THR group and 15% in the THR group. Analyzing type of procedure and approach revealed no significant differences on Chi2: 40% initial fragment removal in the non-THR and 40% in the THR group; 33% initial osteosynthesis in the non-THR and 35% in the THR group.

Mean FU was 35 months in the non-THR group and 42 months in the THR group (non-significant on Student test; Table 4). As expected, and despite the low numbers, osteonecrosis was more frequent in the THR group (Chi2; \( p = 0.0002 \)). Both cases of postoperative infection followed secondary THR. In the THR group, before implantation, there was more hip stiffness (Chi2; \( p = 0.026 \)) and limitation of ROM (Chi2; \( p = 0.009 \)), and the VAS score was higher (Student, \( p = 0.0004 \)) than in the non-THR group at end of follow-up. Work or sport was not resumed more quickly in the non-THR group (Chi2; \( p > 0.05 \)).

Tables 5 and 6 present the distribution of THR at end of follow-up according to Pipkin and Chiron grade, respectively. Classification as Chiron grade 3 was more often associated with THR than the other Chiron grades (Chi2; \( p = 0.03 \)). Chiron grades 1 and 2 did not induce THR; Chiron grades 4 and 5 were too rare for comparison by Chi2. None of the Pipkin grades correlated with THR (Chi2; \( p > 0.05 \)); all 4 Pipkin grade 3 cases had THR, but this small number (< 5) precluded significance on Chi2.

Discussion

The present series incurs the methodological weaknesses inherent to a retrospective design. Data was not available for all follow-up items. Merle d’Aubigné scores were available in only 32.6% of cases, and were therefore not taken into account. Data for the principal failure criterion (THR), however, were available in 84% of cases.

Assessment of the two classifications showed excellent interoperator reproducibility for the Pipkin classification, with kappa coefficients between 0.81 and 1. Pipkin drew up his classification on the basis of X-rays alone, before emergency CT became available, and it does not distinguish between osteochondral fragments and impaction fracture, or between fragments of the lower third of the head, in a non-weight-bearing area, and those of middle third, involving a weight-bearing area with risk for the femoral neck. Likewise, associated acetabular fracture (grade 4) is independent of head fragment size, and the prognostic value (difference in THR rates between grades 1 and 2) cannot be attributed to this. Only Pipkin grade 3 (associated femoral neck fracture) is predictive of THR, as previously reported.
Table 3  Epidemiology according to THR.

<table>
<thead>
<tr>
<th>Group</th>
<th>Male (n = 88)</th>
<th>Mean age</th>
<th>Mean ASA</th>
<th>Smoker (%)</th>
<th>Road accident (%)</th>
<th>Home accident (%)</th>
<th>Sports accident (%)</th>
<th>Work accident (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-THR (n = 67)</td>
<td>52</td>
<td>35.8</td>
<td>1.19</td>
<td>30</td>
<td>83</td>
<td>6</td>
<td>12</td>
<td>81</td>
</tr>
<tr>
<td>THR (n = 25)</td>
<td>20</td>
<td>45.5</td>
<td>1.36</td>
<td>32</td>
<td>80</td>
<td>8</td>
<td>20</td>
<td>20</td>
</tr>
<tr>
<td>Not known (n = 18)</td>
<td>16</td>
<td>36.4</td>
<td>1.17</td>
<td>18</td>
<td>76</td>
<td>17</td>
<td>6</td>
<td>6</td>
</tr>
</tbody>
</table>

Table 4  Evolution according to THR, before implantation and at end of FU.

<table>
<thead>
<tr>
<th>Group</th>
<th>Infection (n = 2)</th>
<th>Necrosis (n = 8)</th>
<th>Pre-THR stiffness (%)</th>
<th>Pre-THR ROM limitation (%)</th>
<th>Mean pre-THR VAS (/10)</th>
<th>FU (months)</th>
<th>Return to work at last FU (%)</th>
<th>Return to sport at last FU (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-THR (n = 67)</td>
<td>0</td>
<td>2</td>
<td>22</td>
<td>0</td>
<td>0.73</td>
<td>35</td>
<td>82</td>
<td>41</td>
</tr>
<tr>
<td>Secondary THR</td>
<td>2</td>
<td>6</td>
<td>50</td>
<td>2</td>
<td>2.6</td>
<td>42</td>
<td>75</td>
<td>33</td>
</tr>
</tbody>
</table>

Five patients with first-intention THR are not included here.

Table 5  Series of patients followed up. THR at last FU according to Pipkin grade.

<table>
<thead>
<tr>
<th>Pipkin</th>
<th>Total</th>
<th>First intention THR</th>
<th>Secondary THR</th>
<th>No THR at end of FU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade 1</td>
<td>28</td>
<td>1</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>Grade 2</td>
<td>14</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Grade 3</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Grade 4</td>
<td>38</td>
<td>0</td>
<td>10</td>
<td>28</td>
</tr>
<tr>
<td>Not known</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>n</td>
<td>92</td>
<td>5</td>
<td>20</td>
<td>67</td>
</tr>
</tbody>
</table>

[18,19]. The Chiron classification showed good interoperator reproducibility, between 0.61 and 0.80, although less than with the Pipkin classification. This finding is firstly due to a certain difficulty in distinguishing grade 2 from grade 3, in which the fracture line passes through the fovea just above the round ligament (Fig. 2): CT sagittal slice reconstruction is necessary for this distinction to be made. The Brumback et al. [16], Yoon et al. [17] and AO [33] clas-

Table 6  Series of patients followed up. THR at last FU according to Chiron grade.

<table>
<thead>
<tr>
<th>Chiron</th>
<th>Total</th>
<th>First intention THR</th>
<th>Secondary THR</th>
<th>No THR at end of FU</th>
</tr>
</thead>
<tbody>
<tr>
<td>1A</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>1B</td>
<td>12</td>
<td>0</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>1C</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>2A</td>
<td>17</td>
<td>0</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>2B</td>
<td>14</td>
<td>0</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>2C</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3A</td>
<td>16</td>
<td>2</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>3B</td>
<td>11</td>
<td>0</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>3C</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>4A</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>4B</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>4C</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5A</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>5B</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5C</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Not known</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>n</td>
<td>92</td>
<td>5</td>
<td>20</td>
<td>67</td>
</tr>
</tbody>
</table>
sifications focus on the weight-bearing location above the foveal insertion area of the round ligament. The prognostic value of Chiron grade 3 was confirmed in the present study. Distinguishing between osteochondral fragments (grade 1), superior impaction (grade 5) and acetabular fracture (grade B) also requires CT, which was available for only 82% of the files analyzed. Moehring [22] described osteochondral lesions in weight-bearing locations; in the present study, this corresponded to Chiron grade 5, but the small number of such cases was probably underestimated by the absence of CT scans with sagittal reconstruction in the older files. It was indeed CT that drew attention to such subchondral bone-impaction fractures in weight-bearing locations [8,20]. Prognosis is very poor for these lesions, which are hard to identify. Early MRI after reduction could probably identify such “bone bruise” lesions, caused by femoral head impact [10,21]. CT assessment with slice reconstruction is now systematic in these cases of severe trauma, and diagnosis can now be classified on the Chiron scale more reliably.

Treatment options, including primary surgery as such, remain controversial in the literature [34]. A consensus is emerging in favor of surgical management of displaced fragments [11,29,35,36]. Certain authors, however, recommend abstention where lesions are too large [11], secondary THR being an option after capsule healing. In the particular case of non-reducible dislocation, it is, however, preferable to operate on the hip rather than risk fracture of the femoral neck [37]. In the present series, orthopedic management was not focused on any particular grade of lesion (Table 3). A posterior approach was recommended by the earliest authors [1,4,5,7,38]: the main argument derives from the notion of traumatic posterior capsular lesion, justifying a posterior approach, which is hardly controversial where lesions of the posterior wall, posterior or transverse column of the acetabulum are associated [38]. In the present series, posterior approaches to the femoral head usually involved fragment removal. The Swiss school recommends a posterior approach with trochanterotomy, to improve exposure of the anterior part of the femoral head or in case of non-reducible dislocation [25,27]. Many more recent authors recommend an anterior approach [24,26,29]: it less often leads to fragment removal, and does not increase the risk of vascular lesion at the femoral head [26]. A medial approach is also possible, giving direct access to the fragment, thereby simplifying osteosynthesis. A pragmatic attitude suggested by Mehta and Routt consists in reducing the dislocation, then using an anterior approach in case of surgery, if and only if there is no associated posterior acetabular fracture [29]. It is difficult to recommend fragment osteosynthesis rather than removal; in the present series, both gave the same number of cases of evolution towards stiffness and ultimate THR. Lederer et al. [19] claim removal to give better results than fragment conservation and fixation. Only large fragments are amenable to osteosynthesis. The problem is different when the fracture line passes through a weight-bearing area (Pipkin 2, Chiron 4 and 5): if the fragment is large, it is worth conserving and fixing [39]. Osteosynthesis of large fragments in non-weight-bearing areas (Pipkin 1, Chiron 2 and 3) may provide better results than removal or orthopedic management. The present study was not determining in this regard. Arthroscopy is an efficient emerging technique for extracting small intra-articular fragments [30,31], and was used in four of the present cases. Percutaneous screwing was associated in one case, to fix a large intra-articular fragment under visual control. Arthroscopy is also a precious diagnostic aid for infraradiological chondral lesions and labral lesions. Prognosis would probably be more precise with early intra-articular assessment.

Conclusion

The Chiron classification proved of prognostic value. To be reproducible, it requires emergency CT imaging. The present series did not identify one treatment option as more effective overall. A posterior approach enables osteosynthesis of any associated acetabular fracture and removal of femoral head fragments, osteosynthesis of which more often uses an anterior or medial approach. The notable prognostic feature of femoral head fractures is that THR is performed in 20% of patients in the 6 months following trauma.

Conflict of interest statement

None.

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