

## Case series



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## Acetabular fractures in the elderly ( $\geq 60$ years old): apropos of 33 cases

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## Abstract

*Acetabular fractures in the elderly are serious fractures because they affect a deep, load-bearing and at first difficult surgical joint, all complicated by an osteoporotic tissue condition. We conducted a retrospective descriptive study over 10 years (January 2010 to January 2020, including 33 patients aged  $\geq 60$  years with acetabular fractures treated at the Orthopedics and Traumatology Department B4 of CHU Hassan II Fes. The aim was to study the types of fractures and to evaluate their treatment as well as the functional result obtained in order to compare them with those of the literature. We collected the data using an exploitation sheet and their analysis was facilitated*

by the EPI info7 statistical analysis software. The average age of our patients was 65.5 years, with a clear male predominance. Road Traffic Accidents represented the main etiology (72.7%), and the left side was the most affected 54.5%. The para-clinical assessment, based on the Anteroposterior iliac and obturator radiological views and confronted with the CT scan made it possible to pose the diagnosis of the fracture, to establish the type according to the Judet and Letournel classification of acetabular fractures, and to evaluate the displacement and articular congruence according to the Duquenois and Coll criteria as well as those of Matta. Elementary fractures were the most frequent at 54.5%. We opted for orthopedic treatment in 72.7% of the cases with none weight bearing in 62.5%; whereas the surgical treatment was carried out in 27.3% with the use of the special acetabular plate in 66.7% of the operated cases. The Kocher-Langenbeck posterior approach was the most used (66.7%). The vertical congruence between the femoral head and the roof of the acetabulum after reduction was satisfactory in 27.3% of the cases and the horizontal congruence between the femoral head and the entire acetabulum in 18.2% of the cases. In our series, we noted as a complication 12 cases of post-traumatic osteoarthritis, ie 36.3%. The results according to the Postel Merle d'Aubignè score at an average follow-up of 62 months were satisfactory (excellent, very good and good) in 27.3% of the cases and unsatisfactory (fair, poor and bad) in 72.7% cases. The surgical management of fractures of the acetabulum in elderly and osteoporotic patients remains subject to controversy and is not entirely satisfactory. Would not primary arthroplasty combined with open reduction internal fixation constitute a better management approach in old people?

## Introduction

The incidence of pelvic and acetabular fractures in the elderly is increasing [1]. Epidemiological studies have shown that the incidence of such fractures is expected to double approximately in the next 20 years in people over the age of 60 [2]. Both high and

low energy mechanisms are implicated [3]. The diagnosis of these fractures is essentially radiological; it is based on a precise analysis of standard X-rays of the affected hip, which sometimes may be insufficient and supplemented by CT scan with reconstruction, thereby refining the lesion assessment. The management of acetabular fractures in the elderly is becoming increasingly difficult not only because of the comorbidities but also of osteoporosis which tends to lead to unfavorable results [4]. Conservative treatment for these patients seems to lead to unsatisfactory functional results and high mortality rates [5]. The treatment objectives are mainly the rapid and stable restoration of joint function associated with early and painless mobilization in order to reduce the risk of postoperative complications [4]. The conservative management approach tends to be abandoned in favor of internal fixation associated with simultaneous total hip replacement surgery [6]. According to a systemic review (including 15 studies), 23% of patients underwent revision surgery with conversion to total hip arthroplasty after an average follow-up of 64 months from initial conservative management [7]. Revision surgery in elderly patients with major comorbidities carries an increased risk of perioperative complications and delays recovery [8]. Internal fixation associated with simultaneous total hip replacement is adopted to avoid these disadvantages [4]. Few studies deal with acetabular fractures in the elderly [7]. The algorithm for treating these complex fractures is not well described. The aim of our work was to study the types of fracture and assess their treatment as well as the functional results obtained in order to compare them with those of the literature.

## Methods

We conducted a descriptive retrospective study, including patients with acetabular fractures treated at the Orthopedics and Traumatology Department B4 of CHU Hassan II Fes over a 10-year period from January 2010 to January 2020. Included in the study

were all subjects aged at least 60 years and having an acetabular fracture treated surgically or orthopedically and excluded were those whose age was less than 60 years and/or those whose records were unusable. Our work aimed to: study acetabular fractures in the elderly and evaluate the treatment; clinical and radiological analysis of acetabular fractures in the elderly; the study of treatment methods and its indications; evaluation of radiological and functional results. We began our study with the development of an exploitation sheet in order to collect epidemiological, treatment and prognostic data. For the functional evaluation, we adopted the Postel Merle d'Aubigné score following the recommendations of the 1981 S.O.F.C.O.T (Société Française De Chirurgie Orthopédique Et Traumatologique) symposium [9]. At the end of our data collection, 33 cases were retained. This data was analyzed using the EPI Info 7 statistical software.

## Results

A total of 33 cases of acetabular fractures were collected in patients with an average age of 65.5 years with a male predominance of 91% against 9% of women only. In our series, 12 patients (36.4%) had no significant pathological history, 9 patients or 27.3% were diabetic, 6 or 18.2% hypertensive, 3 had a history of cardiac disease or 9.1% and 3 asthmatics or 9.1%. RTAs constituted the most incriminated injury mechanism with 72.7% of cases followed by falls with 27.3% of cases. The left side was the most affected with 54.5% and we did not note any lateral damage. Multiple associated lesions were noted; they were dominated by abdominal lesions in 12 patients (36.4%). In our series, all our patients benefited from three standard images: anteroposterior, iliac oblique and obturator oblique views. 24 (72.7%) patients received a CT scan. We have adopted the Judet and Letournel classification which is based on the concept of the anterior column, the posterior column and no man's land. Thus we were able to establish the mapping of the bone lesions identified by classifying them into elementary fractures and

complex fractures (Table 1). Note that elementary fractures were the most frequent and represented 54.5% of the cases. We studied the congruence between on the one hand the femoral head and the roof of the acetabulum (vertical congruence) and on the other hand between the femoral head and the entire acetabulum (horizontal congruence) according to the Duquenois and Col criteria and the results obtained were recorded in the following tables (Table 2). All our patients received medical treatment based on: analgesics, non-steroidal anti-inflammatory drugs and anticoagulants. In our study, 24 patients benefited from orthopedic treatment, i.e. 72.7% which was dominated by non weight bearing in 15 out of 24 patients (62.5% of orthopedic treatment) and transcondylar traction in 9 out of 24 patients, ie 37.5%. Surgical treatment was indicated in 9 patients (27.3%) for 3 fractures of the anterior column (9.1%), 3 fractures of the posterior column (9.1%) and 3 fractures of the posterior column + posterior wall (9.1%). The average time for surgical management was 5 days. The preoperative preparation of all operated patients was done using dermal betadine.

All the operated patients benefited from a general anesthesia. The surgical approach used was posterior (Kocher-Langenbeck) in 6 operated patients or 66.7% and anterior (Judet and Letournel ilio inguinal approach) in 3 operated patients either 33.3%. 66.7% of our operated patients benefited from a special acetabular plate and 33.7% from plate fixation and screw fixation (Figure 1). Regarding postoperative follow-up, antibiotic therapy was systematic in all of our patients; treatment was started at the induction of anesthesia and continued for 48 hours, then relayed by oral administration. All our patients were put on low molecular weight heparin at a preventive dose until ambulation, to avoid thromboembolic complications. Rehabilitation was started in the immediate postoperative period: It consisted of exercises of mobilization of the lower limbs and some isometric contractions. Gait training was done using two crutches from day 45. None of our patients presented an immediate or secondary postoperative complication of an

infectious, hemorrhagic or neurological nature but 12 patients or 36.3% presented post-traumatic osteoarthritis. In our series, all our patients were seen in consultation with an average follow-up of 62 months, the extremes of which varied from 24 months to 120 months. The post-operative anatomico-radiological results evaluated by the criteria of Matta *et al.* [10]. Reported no perfect anatomical reduction versus 72.7% satisfactory reduction and 27.3% unsatisfactory reduction. The functional evaluation of the results obtained was carried out using the rating of Postel Merle d'Aubigné, ie 27.3% of excellent results very well and well; and 72.7% poor and poor fair results.

## Discussion

The average age of the patients was 65.5 years with extremes ranging from 60 to 80 years. This is lower than the 72 years obtained by Anglen *et al.* [11] and the 72.5 years obtained by Hessmann *et al.* [12] even less than the 77 years obtained by Firoozabadi *et al.* [13]. Over the past two decades, there has been an increase in the incidence of geriatric acetabulum fractures due both to longer life expectancy but also to increasing activity levels of the elderly [1]. The male predominance in our study 10 M/1 F is similar to that found by Firoozabadi *et al.* [13] with a sex ratio of 3 Male/female; on the other hand, we note a female predominance in the Scandinavian studies Ragnarsson B [14] with a sex ratio of 3F/M and P.KANNUS 4F/M [15]. This can be explained by the important place occupied by women in the working life of Scandinavians. Acetabular fractures in the elderly generally occur as a result of low energy trauma. We note in our study as in the Anglen study [11] that Road Traffic Accidents come in first place with RTAs accounting for 72.7% of acetabular fractures in our study against 62% in the Anglen study respectively. Falls come in second place, they accounted for 27.3% of acetabular fractures in our study against 38% in the Anglen study. These results are different from those of Reza Firoozabadi *et al.* [13] who found RTAs accounting for 29.5% of acetabular fractures with falls accounting for

70.5%. Associated lesions were found in our series at 18.2% compared to 21% in the series by Ferguson T.A *et al.* [16] for pelvic lesions. The same series found a central dislocation in 17.5% of the patients which is similar to the 18.2% found in our series. Elementary patterns (according to the Judet and Letournel classification) were the most common type of lesions in our series.

Surgical management in our study was indicated in 9 cases, that is 27.3% which is lower than those found by Walley K. *et al.* [17] which was 43%. The time between the trauma and its surgical management varied from 4 to 7 days in our series and general anesthesia was the type of anesthesia used in all patients both in our series and in that of the vast majority of the literature. Indeed, the complexity of the surgical approach associated with the duration of this type of hemorrhagic surgery motivates the choice of general anesthesia. Plate fixation was used in the majority of our patients, however 33.3% benefited from screw fixation in addition to the plate fixation, which is similar to the 28% found by Guerado E. *et al.* [18]. Our anatomical results were evaluated according to MATTA criteria. The absence of perfect anatomical reduction in our series as well as in that of Guerado E. [18] can be explained by advanced age and osteoporotic bone. Herein lies all the difficulty encountered in the elderly. (Table 3) Miller AN [19]. Our functional results were evaluated using the Merle d'Aubigné Postel score after an average follow-up of 62 months. Twenty seven point three percent of our functional results were excellent, very good and good compared to 64% in the Dana Mears series while 72.7% were fair, poor and poor compared to 36% in the Dana Mears series. The quality of the reduction is markedly reduced when the patient's age is above 60 years, the operating time (beyond 3 weeks), or when the complexity of the fracture increases [20]. We did not find any case of death or any immediate or early post-operative complication in our series probably because of the size of our sample. Nevertheless 12 cases (36.4%) of secondary coxarthrosis were found compared to the 32% found by Ferguson *et al.* [16]. The mortality

rate found in literature is linked to associated comorbidities and to advanced age.

## Conclusion

In the light of our study and the results of the literature we can conclude that the traditional open reduction fixation treatment is not entirely satisfactory while exposing the patient to prolonged decubitus as well as to the risks inherent in the secondary surgical revision often necessary. Primary arthroplasty coupled with open reduction internal fixation would therefore be a credible and effective alternative for the management of acetabular fractures in the elderly whose organism is fragile and their autonomy precarious.

### What is known about this topic

- *The studies on fractures of the acetabulum in the elderly are not very numerous in the literature;*
- *The therapeutic means used are multiple and the care is multidisciplinary which makes the overall cost of treatment high.*

### What this study adds

- *Acetabular fractures are observed more and more in elderly subjects due to the aging character of the African and world population associated with their increased participation in the labor force;*
- *We have highlighted the modest nature of the results obtained with a conservative approach, thus raising the relevance of the non-conservative approach which is increasingly practiced internationally.*

## Competing interests

The authors declare no competing interests.

## Authors' contributions

All the above-mentioned authors have contributed actively to this subject, notably for the exploitation

of the files, the collection and the analysis of the data. They also declare that they have read and approved the final version of the manuscript.

## Tables and figure

**Table 1:** distribution of the different type of fractures observed in our series

**Table 2:** distribution of the patient by vertical congruence and horizontal congruence

**Table 3:** reduction obtained in our series compared to that of the literature

**Figure 1:** anterior and posterior column fracture supported by special acetabular plate

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**Table 1:** distribution of the different type of fractures observed in our series

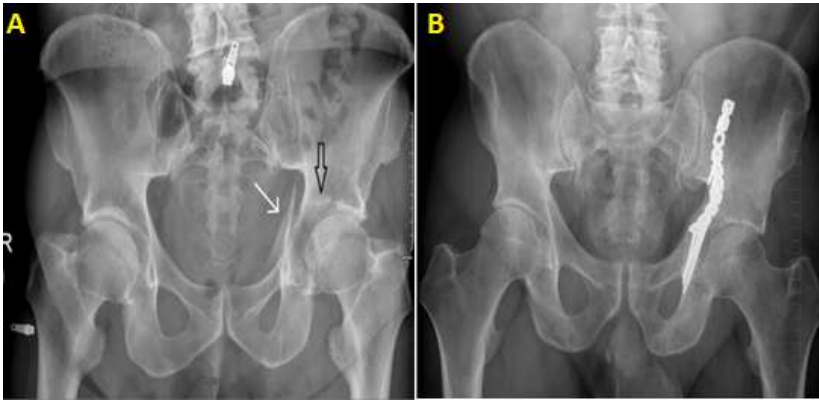
Type of fracture	Frequency	Percentage
<b>Elementary fractures</b>	<b>18</b>	<b>54.5%</b>
Posterior wall fracture	12	36.4%
Posterior column fracture	3	9.1%
Anterior well fracture	0	0%
Anterior column fracture	3	9.1%
Transverse fracture	0	0%
<b>Fractures complexes</b>	<b>15</b>	<b>45.5%</b>
T. Fracture	0	0%
Transverse + P.W. fracture	0	0%
Posterior column fracture + posterior wall	12	36.4%
Anterior column fracture + hemi transverse of posterior column	0	0%
Anterior and posterior column fracture	3	9.1%
<b>Total</b>	<b>33</b>	<b>100%</b>

**Table 2:** distribution of the patient by vertical congruence and horizontal congruence

Vertical congruence	Number	Percentage
TT3	0	0%
TT2	6	18.2 %
TT1	12	36.4 %
TT0	15	45.4 %
Horizontal congruence	Number	Percentage
TT3	0	0%
TT2	6	18.2 %
TT1	12	36.4 %
TT0	15	45.4 %

**Table 3:** reduction obtained in our series compared to that of the literature

Type of reduction	Our series	Miller	Guerrado
Anatomical (< 1 mm)	0%	58%	0%
Satisfactory (1-3mm)	72.2%	29%	51%
Not satisfying (>3mm)	27.3%	13%	49%



**Figure 1:** anterior and posterior column fracture supported by special acetabular plate