Results of the Conservative Treatment of Acetabular Fractures

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Purpose. To study the evolution of patients with acetabular fractures treated conservatively

Material and methods. A series of 37 consecutive cases treated conservatively was analyzed. The minimum follow-up was 5 years. Fractures were treated with bed rest and traction, which were followed by a non weight-bearing period and a partial weight period. Patients were clinically and radiographically assessed. The different kinds of treatment were evaluated on the basis of the type of traction used, the length of the non weight-bearing period and the duration of the partial weight bearing one. The degree of displacement was also considered, in particular as it related with the patients’ subsequent evolution.

Results. Twenty fractures did not undergo any sort of displacement, 8 had a displacement of 2-5 mm, with 9 cases having a displacement higher than a 5 mm. At the end of follow-up, 8 patients experienced pain, 15 limited mobility and 8 had radiographic signs of osteoarthritis. The degree of displacement was correlated with the final result obtained.

Conclusions. Conservative treatment can be an appropriate indication for acetabular fractures when the patient’s condition, the type of fracture or bone quality advise against performing an osteosynthetic procedure.

Key words: fractures, acetabulum, conservative treatment.
ent types of approaches in order to achieve an anatomical reduction and ensure a good long-term result. In the last few years, numerous series have been published of fractures treated surgically; however, the literature does not contain many reports of cases treated conservatively. In this paper, we have analyzed fractures treated conservatively in our hospital between 1994 and 1998, with a minimum follow-up of 5 years.

MATERIALS AND METHODS

Between January 1994 and August 1998 41 cases were consecutively recorded of patients with an acetabular fracture who had been treated conservatively. Four of them were lost to follow-up, (one of them died and the other three were transferred to a different hospital). Our series comprises 37 cases treated conservatively with a minimum follow-up of 5 years.

Patients were assessed both clinically (age, pain score, mobility and gait) and radiographically by mains of plain films (A/P, alar and obturator).

Eighteen patients required a CT-scan. The radiographic study assessed the involvement of the anterior wall, the anterior and posterior columns, the posterior wall as well as the bottom of the acetabulum. The fractures were classified according to Letournel’s classification (Fig. 1) into Grade A (4 cases), Grade B (3 cases), Grade C (2 cases), Grade D (10 cases), Grade G (6 cases), Grade H (11 cases) and Grade I (1 case). There were no Grade E or F fractures.

As regards the degree of displacement, fractures were divided into non-displaced fractures (fractures with a displacement of up to 2 mm were also included in this category), fractures with a displacement between 2 and 5 mm and fractures displaced in excess of a 5 mm.

Initially, all fractures were treated by means of bedrest with traction for 24 days on average (range: 8-45). This was followed by a period during which no weight-bearing was allowed (15 to 76 days; mean: 20 days) and finally partial-weight bearing was permitted for 4 to 12 weeks. Traction was hard in 29 patients and soft in 8. The type and duration of the traction were the variables considered to define the type of treatment used. The weight-free and partial weight-bearing periods were also taken into consideration.

In addition to fracture distribution, variables like pain level, gait and mobility were correlated with displacement and age, as well as with the fracture production mechanism and type. Results were statistically analyzed by means of the SPSS 10 for Windows software, using Fisher’s exact test.

RESULTS

Epidemiology

Of the 37 patients, 22 were male and 15 female, with a mean age of 45 (range: 18-93 years). The right acetabulum was injured in 22 cases and the right one in 15. As far as the etiology is concerned, it was classified as low-energy trauma in 32.4% of cases and high-energy trauma in 67.6%. Traffic accidents were the most frequent cause.

The presence of associated lesions was also investigated. The fracture types were analyzed in relation to the patients’ age. In the under 30 age group, where males predominated (71.4%), 78.6% of fractures were high-energy. In patients between 30 and 65 males accounted for 81.8% of patients and high-energy fractures were 90.9%. However, in patients older than 65, 66.7% of fractures were low-energy with women accounting for most of these (75%) (Fig. 2).

Of the 37 fractures studied, 12 were low-energy. 66% presented with associated lesions, generally another osteoporotic fracture. In 75% of cases the fracture involved the bottom of the acetabulum, and in 66% of cases displacement was less than 2 mm. Nonetheless, the clinical evolution of this group of patients was worse than that of the high-energy group (25% referred an onset of pain during evolution). Forty-one percent had a reduced mobility and 33% had signs of osteoarthritis (Table 1).

Twenty-five patients sustained acetabular fractures as a result of high-energy trauma and 80% of them presented with other associated lesions.

Pain, mobility and signs of osteoarthritis

At the end of the follow-up to conservative treatment, 8 patients complained of pain (21.6%), 15 had restrictions to hip mobility (40.5%) and 8 had radiographic signs of osteoarthritis (21.6%).

Displacement

Forty-eight percent of fractures had displacement of less than 2 mm, in 28% displacement was between 2 and 5 mm, and in 24% (6 cases) it was larger than 5 mm. In 32%
of cases the fracture affected the bottom of the acetabulum; the anterior column was the area most frequently involved (84%), followed by the posterior column in 52% of cases. Although 40% of cases showed reduced mobility (especially as far as flexion was concerned), degenerative signs were observed in only 16%, and just a single patient complained of pain in the follow-up. Fisher’s exact test enabled us to find a connection between fracture displacements of more than 2 mm and the presence of pain (bilateral significance: 0.01), the limitation of mobility (bilateral significance: 0.001) and the appearance of osteoarthritis (bilateral significance: 0.01) that resulted in a linear association between the degree of displacement and pain (0.01), mobility (0.001) and osteoarthritis (0.014).

Age and Fracture Production Mechanism

As to age and fracture production mechanism, in the group of Ander 65s (25 patients) 21 had suffered high-energy trauma, with 14% complaining of pain. The 4 patients who had suffered low-energy trauma were pain-free but one of them had limited mobility with mild signs of osteoarthritis. Of the 12 patients older than 65, 4 had high-energy fractures, with two of them suffering from pain and osteoarthritis and three from restricted hip mobility. Eight had sustained low-energy fractures, with three of these suffering from pain and signs of osteoarthritis (37%).

Fracture type

Fractures of Grade H (31%), D (22%) y G (15%) were the ones that showed higher levels of pain. Grades D and H

Table 1. Types of fracture, degree of displacement and results according to the level of energy of the trauma

<table>
<thead>
<tr>
<th>Mechanism</th>
<th>Low energy</th>
<th>High energy</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>12</td>
<td>25</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>59.8</td>
<td>38.5</td>
</tr>
<tr>
<td>Involvement anterior column</td>
<td>91%</td>
<td>84%</td>
</tr>
<tr>
<td>Involvement anterior wall</td>
<td>8%</td>
<td>20%</td>
</tr>
<tr>
<td>Involvement posterior column</td>
<td>83%</td>
<td>52%</td>
</tr>
<tr>
<td>Involvement posterior wall</td>
<td>8%</td>
<td>44%</td>
</tr>
<tr>
<td>Transverse</td>
<td>8%</td>
<td>40%</td>
</tr>
<tr>
<td>Non-displaced</td>
<td>66%</td>
<td>48%</td>
</tr>
<tr>
<td>Displacement 2-5 mm</td>
<td>8%</td>
<td>28%</td>
</tr>
<tr>
<td>Displacement &gt; 5 mm</td>
<td>25%</td>
<td>24%</td>
</tr>
<tr>
<td>Limitation of mobility</td>
<td>41%</td>
<td>40%</td>
</tr>
<tr>
<td>Osteoarthritis at 5 years</td>
<td>33%</td>
<td>16%</td>
</tr>
<tr>
<td>Pain</td>
<td>25%</td>
<td>5%</td>
</tr>
</tbody>
</table>

Figure 2. (A) A/P radiograph of a posterior-column fracture in a 70-year-old female further to low-energy trauma. (B) Alar view of the same fracture that affords a better view of the posterior column; it can be observed that there is no displacement of the fracture.
were also those most frequently associated with limitations of mobility (44% and 43% respectively). In Grade H fractures we observed the highest incidence of osteoarthritis (37%). Twenty fractures with displacement lower than 2 mm had no pain, with an incidence of reduced mobility of 15% and 5% respectively. Of the 8 fractures displaced between 2 and 5 mm, two were accompanied by pain, 2 showed signs of osteoarthritis and 4 a slight limitation of movement. Of the 9 fractures with displacement greater than 5 mm, 8 had limitations in mobility, 6 complained of pain and 5 had radiographic signs of osteoarthritis (Fig. 3).

**DISCUSSION**

The anatomical complexity of the acetabulum and the difficulty inherent in surgically reconstructing it have given rise to the tendency to treat many acetabular fractures conservatively observed in the reviews published in the literature. Even for Rowe and Lowell1 conservative treatment yields better results than surgery. Nonetheless, the advances made in osteosynthesis, the new approaches developed and the systematization of the classification of these fractures have all improved the results of surgical treatment. It is a widely accepted fact that in these cases surgical treatment of displaced acetabular fractures leads to better results than conservative approaches3-6,9-15.

The anatomical reconstruction of the joint surface of the acetabulum is the key factor required to obtain a good clinical and radiographical result. The different series subjected to surgical treatment obtained a good anatomical reconstruction in 56%-85% of cases, depending on the complexity of the fracture and the surgeon’s expertise4,7,9,10-19. When the reconstruction of the acetabular is not anatomical and an ORIF procedure becomes necessary results tend to be poorer since only 56% of results are good, with the time elapsed from surgery becoming the limiting factor14.

The quality of the reduction determines the clinical result obtained. An anatomical reduction leads to good results in around 80% of cases, but when reduction is poor the ratio of good results plummeted to around 30%4. The published series report good and excellent results in between 57% and 87.5% of cases4-7,9-19. Factors that lead to bad results are old age10,12,13,16,17, avascular necrosis of the femoral head9,12,16,17, associated hip dislocation9,12, heterotopic ossifications3,12,20, postponement of surgery6,15, or postoperative fragment displacement larger than 3 mm17. However, other authors report that effective reduction and fixation do not guarantee a good functional result as can be inferred from the fact that some series have obtained only 57% of good and excellent results5,11,12.
In our series the ratio of good results stood at around 78% if pain is taken as the only criterion. However, 40% of patients showed reduced mobility and 21.6% developed osteoarthritis during follow-up. These results are poorer than those in series like Tornetta’s21, who reported 91% of good results, even if his series comprised only non-displaced fractures whose stability was demonstrated through dynamic radioscopy. Our series also contains displaced fractures treated conservatively because the quality of the bone or the patient’s general condition did not permit surgical treatment.

In our view, the fracture’s degree of displacement is directly proportional to the appearance of pain, reduced mobility and osteoarthritis. Our series is complicated by the presence of eight fractures displaced between 2 and 5 mm and 9 displaced more than 5 mm that were not operated because they were osteoporotic fractures in elderly patients, or because they had severe associated lesions. These patients would have reduced our rate of good results.

If we take the energy of the trauma, low-intensity fractures usually show less displacement and therefore respond well to conservative treatment. Of the 12 patients we had with this type of fracture 4 had displacement of more than 5 mm, all of whom developed pain and osteoarthritis during evolution – probable because these were over 65s with osteoporotic bone who would show displacement even in the face of low-energy trauma. Of the 25 high-energy fractures only 5% developed pain and 16% mild osteoarthritis, although 52% presented with displacement.

One of the factors disposing patients to a poor result is old age 10,12,13,16,17; this was also seen in our results. In the group of patients older than 65, 41% had pain and 41% had osteoarthritis whereas in under 65s only 12% referred pain and 12% osteoarthritis, regardless of production mechanism and degree of displacement. This is in line with the group of low-energy fractures in the elderly group, which by involving osteoporotic bone produce a greater displacement than that which would correspond to the energy of trauma.

On some occasions, there is a tendency to treat complex and displaced fractures in osteoporotic patients in a conservative way and, once healing has occurred, perform a total hip arthroplasty. However, prosthetic results in these cases of posttraumatic osteoarthritis are poorer than those of primary osteoarthritis surgery 22 because bone defects and the disruption of the acetabular anatomy make surgery more complex. Other authors show good ORIF results with elderly patients, like Helfet et al 20, who obtained over 90 points on Harris’ score in a series of 17 patients over 70 years of age two years post-op. The number of cases in our series was too low to enable us to use Letournel’s classification to compare our fracture types and functional results. The acetabulum’s structural strength is concentrated mainly on its anterior column 23. However, fractures involving just the anterior column respond well to conservative treatment 8. In our series, we did not treat conservatively any fracture of the posterior wall that compromised the posterior stability of the hip. In all cases where there was an associated dislocation, this was reduced and subsequently the stability and conformity of the reduction were tested; if the reduction was not stable it was surgically stabilized. However, sometimes posterior wall fractures compromising the joint’s stability, i.e. involving less than 50% of the wall, may overload the upper part of the acetabulum and favor the appearance of osteoarthritis 23.

The current trend is to approach surgically all acetabular fractures when there is displacement greater than 2 mm, incarcerated/sequestered intraarticular fragments, associated hip instability or an involvement of the acetabular surface greater than 45° 21. Conservative treatment is a solution for those acetabular fractures that cannot be surgically addressed because of the condition of the patient, the fracture type or the quality of the bone present.

REFERENCES


Conflict of interests: We, the authors, have not received any economic support to carry out this study. Nor have we signed any agreement with any commercial firm to receive benefits or fees. On the other hand, no commercial firm has provided nor will provide economic support to non-profit foundations, educational institutions or any of the other organizations that we are members of.