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# Post wall fixation by lag screw only in associated both column fractures with posterior wall involvement

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ABSTRACT

*Purpose:* To evaluate the quality of reduction, clinical outcomes and complications of associated both column acetabular fractures with posterior wall involvement that are treated through single ilioinguinal approach and fixation of posterior wall by lag screws only.

*Methods:* We conducted a retrospective review involving ninety-nine consecutive patients with associated both column fractures of acetabulum treated through single ilioinguinal approach. Patients were divided into two groups. The first group consisted of 35 patients presented with both column fractures with posterior wall involvement that fixation performed with lag screws. This group was compared to a second group of 64 patients with both column fractures without posterior wall involvement. The quality of reduction was assessed using criteria described by Matta. The size of posterior wall fragment was measured. Functional outcome was evaluated using Modified Postel Merle D'Aubigne score. Radiographs at the latest follow up were analyzed for arthritis (Kellgren-Lawrence classification), and femoral head avascular necrosis (Ficat/Arlet classification).

*Results:* The study showed no significant differences in all preoperative variables ($P > 0.05$). While intraoperative blood loss and operative time in group 1 were increased compared to group 2, the difference was not statistically significant ($P > 0.05$). The height, relative depth and peripheral length of posterior wall respectively were $27.8 \pm 2.5$ mm (range: 24–35 mm), $71.5 \pm 5.4\%$ (range: 65–88%), $23.0 \pm 2.3$ mm (range: 17–28 mm). The mean posterior wall fracture displacement is $5.0 \pm 3.2$ mm (range: 0–11 mm). There was no difference regarding the quality of reduction between the two groups ($P > 0.05$). The excellent to good clinical outcome was around 71.4% in the group 1 versus 73.4% in the group 2 at the final follow-up, this difference was not statistically significant ($P > 0.05$). There was no difference in rate of complications between the two groups ($P > 0.05$).

*Conclusions:* Lag screws fixation of posterior wall through single ilioinguinal approach in associated both column fractures of acetabulum is a safe and effective method. Our results shown that the presence of posterior wall fracture in cases of associated both column fractures does not compromise the clinical outcomes.



## Introduction

Fractures of the posterior wall of the acetabulum may be isolated or associated with injuries to other local anatomical structures. These associated injuries might be acetabular fractures, the most common being posterior column, transverse, or T-shape patterns. Because the femoral head directly strike on the posterior wall of acetabulum, and the posterior wall fracture frequently is multi-fragmentary and involves marginal impaction, or lesions of the femoral head [1,2]. This type of posterior wall fractures is difficult to treat and the focus of the most of the published reports [1–4]. In our clinical practice, we found that associated both column fractures frequently involves the posterior wall (Fig. 1), the fracture pattern of posterior wall fragment different than mentioned above due to difference in mechanism of injury. The femoral head directly strike on the anterior medial wall of acetabulum often resulting in the femoral head central dislocation, therefore the posterior wall fracture often is a large size fragment, noncomminuted, nondisplaced or minimally displaced, the hip joint capsule is intact, and femoral head fractures are uncommon.

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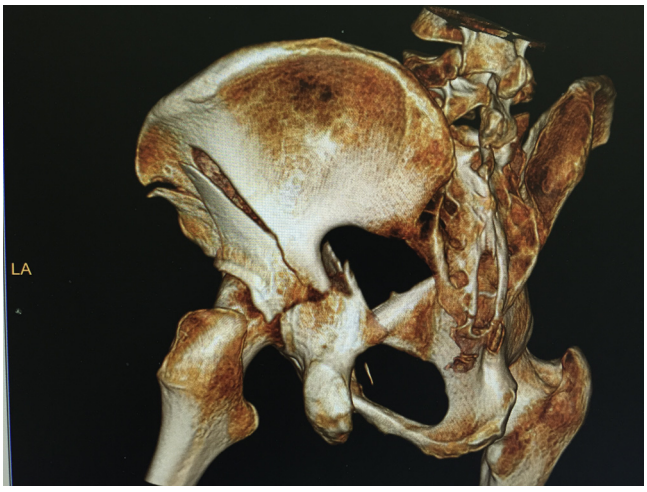


**Fig. 1.** Computer tomography reconstruction image showing the associated both column fracture with posterior wall involvement.

The best way to treat the posterior wall fragment and if posterior wall fracture compromise the clinical outcomes in cases of associated both column fractures is not well defined.

Because of posterior wall involvement, some authors suggest that simultaneous Ilioinguinal and Kocher-Langenbeck approaches for the treatment of associated both column fractures [5,6]. Although it allows for direct fracture visualization and anatomic restoration of the joint surface that is a key factor for future prognosis, they have been associated with longer operative times and higher rates of complications [5–7]. Moreover, most of authors consider that complex acetabular fractures are best treated by a single surgical approach, and combined approach is indicated when good reduction is not possible by a single or nonextensile approach [8,9]. To the best of our knowledge there is no data available investigating the outcomes.

The purpose of this study was to evaluate the quality of reduction, clinical outcomes and complications of associated both column acetabular fractures with posterior wall involvement that are treated through single ilioinguinal approach and fixation of posterior wall by lag screws only. Associated both column fractures with posterior wall fractures were compared to the ones without posterior wall involvement in a consecutive series.

## Patients and methods

### *Patients*

Approval from the ethics committee of the hospital was obtained prior to initiation of the study. Inclusion criteria were: acute fractures (<21 days), associated both column fractures of acetabulum treatment through single ilioinguinal approach, followed more than 24 months. Exclusion criteria were: patients who were younger than 18 years of age at the time of the injury, comminuted fracture of posterior wall, femoral head fracture or pelvic ring injuries or with Morel-Levallé lesion, bilateral acetabular injuries, preexisting ipsilateral hip disease, with a fracture related nerve damage, posterior wall fracture with no fixation. Over a seven years period, ninety-nine patients with acute associated both column fractures of acetabulum treatment through single ilioinguinal approach reviewed for this study. These 99 patients were part of a cohort of 419 consecutive patients treated at our trauma center by ORIF for acetabular fractures and prospectively gathered database between January 2007 and January 2015. Patients were divided into two groups: the first group (PW+) consisted of 35 patients presented with posterior wall involvement that underwent fixation by lag screws only. The second group (PW-) comprised of 64 patients without posterior

**Table 1**
Patient demographics and characteristics.

| Variable | PW+ Group(n = 35) mean ± SD | PW- Group (n = 64) mean ± SD | U or $X^2$ value | P value |
|---|---|---|---|---|
| Age(years) | 44.4 ± 12.5 | 48.3 ± 11.8 | 1.630 | 0.103 |
| BMI | 23.4 ± 3.0 | 24.5 ± 3.2 | 1.461 | 0.144 |
| ISS | 12.6 ± 5.4 | 11.3 ± 5.0 | 1.524 | 0.127 |
| Stay in hospital(days) | 11.7 ± 2.3 | 11.5 ± 2.3 | 0.485 | 0.628 |
| OR time(min) | 257.7 ± 60.4 | 241.2 ± 49.1 | 1.515 | 0.130 |
| Blood loss (ml) | 957.4 ± 258.7 | 888.6 ± 153.5 | 0.931 | 0.352 |
| Follow up (months) | 44.7 ± 19.0 | 44.7 ± 18.4 | 0.007 | 0.994 |
| Time to surgery (days) | 5.5 ± 2.5 | 6.0 ± 2.5 | 1.659 | 0.097 |
| Gender | | | | |
| Male | 25 | 47 | 0.046 | 0.83 |
| Female | 10 | 17 | | |
| Left/Right | | | | |
| Left | 16 | 31 | 0.067 | 0.795 |
| Right | 19 | 33 | | |
| Mechanism of injury | | | | |
| Fall | 27 | 47 | 0.357 | 0.837 |
| Car or Motorbike accident | 3 | 8 | | |
| Falls from standing height | 5 | 9 | | |
| Smoking | | | | |
| Yes | 7 | 10 | 0.304 | 0.581 |
| No | 28 | 54 | | |
| Seagull sign | | | | |
| Yes | 2 | 5 | 0.152 | 0.697 |
| No | 33 | 59 | | |
| Lost to follow up | 1 | 2 | 0.005 | 0.942 |

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