

Double Injuries of the Femur - An Analysis of Ipsilateral Femoral Shaft and Femoral Neck/Trochanteric Fractures

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Abstract : Our experience with twenty four cases of ipsilateral femoral neck and shaft fractures were presented. Three hip injuries (12.5 percent) were trochanteric while twenty one hips (87.5 percent) were intracapsular fractures. The femoral shaft fracture was localized to the midshaft in twenty cases (83.4 percent) and the lower third or supracondylar region in four cases (16.6 percent); 83.3 percent of the cases were involved in road accidents, and there was a marked preponderance of the cases involving the right lower limb (5 times). We observed a 5:1 male/female ratio. This was seen to be an injury localized mostly to young adults. Early open reduction and internal fixation of both fractures were advocated, thus avoiding prolonged recumbency, excessive shortening and malunion. Compression screws for the hip and A.O. plate for the femoral shaft were recommended. In cases of trochanteric fractures a blade plate may be a better alternative, although we used a K-nail to fix a Tronzo type 5 fracture associated with femoral shaft fracture. In our opinion, treatment options like non-operative management and McMurray's osteotomy are no longer valid and should be considered obsolete.

INTRODUCTION

In a recent review of ipsilateral intra-capsular fractures of the femoral neck and shaft, less than 220 cases were reported world wide²⁻²⁸, with most of the reports originating in the recent past^{2,6,7,12,14,23,25,27}. A high index of suspicion has to be maintained in all femoral shaft fractures so that a concomitant hip injury is not missed. A better awareness has brought forth a larger number of cases, as was evidenced by the presented report. Since December 1988 along, we had come

across 11 new cases. This report reviewed our experience with this difficult injury; we also presented a management protocol which was not technically demanding and should be the routine in all such cases. In addition we had included our experience with trochanteric fractures associated with femoral shaft fractures.

MATERIALS AND METHODS

From March 1987 to Jan. 1991, twenty four cases of femoral shaft fractures associated with either an intracapsular or trochanteric femoral neck fracture were seen in our orthopaedic department. Two cases were referred to us, in one case the diagnosis of femoral neck fracture was missed initially, and another case was operated else where of the twenty one cases, three femoral neck fracture were missed at our institute, in two cases, initial x-rays had not included the hip, and in one cases the emergency radiograph was of poor quality. The patients were divided into 4 groups according to the management protocol. Group 1 - both fractures were treated non operatively; Group 2 - femoral neck fracture was treated conservatively, femoral shaft fracture was treated by operation; Group 3 - McMurray's osteotomy and internal fixation was done as the primary or delayed treatment of the neck fracture, and for the shaft fracture respectively and group 4 where both fractures were fixed by primary internal fixation. The detail of the cases was given in table 1. Since the last 4 years, our routine protocol was operative which entailed simultaneous internal fixation for both the neck and shaft fracture (Fig. 1). The preferred method of fixation is A.O. cancellous screws with or without bone graft for the femoral neck fracture, whereas A.O. dynamic compression plating is utilized for the shaft fracture.

All cases were classified by the Garden's classification (for intracapsular fractures of the neck), Tronzo's classifica-

tion (for trochanteric fractures), and Winkquist & Hansen²⁹ (for grading of comminution for the femoral shaft fractures). Review at maximum follow up included clinical assessment for union, shortening limb, and range of hip and knee motion. Radiological assessment included evidence of union, avascular necrosis of the head, and coxa vara of the neck.

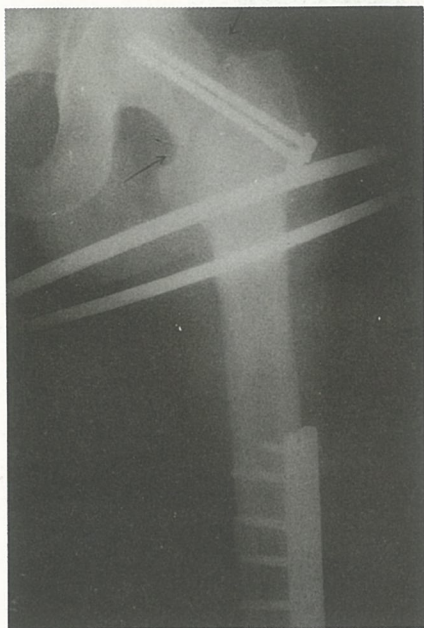


Fig. 1 Immediate post operative x-ray of ipsilateral basal femoral neck fracture fixed by 2 cancellous screws and femoral shaft fracture fixed by A.O. Dynamic Compression Plate.

RESULTS

Group I

Four cases were treated non-operatively; two because they were seen before we had developed a specific protocol, and had significant associated injuries as well, which lead us to adopt a conservative approach. In the other 2 cases, a basal fracture and trochanteric fracture were associated with comminuted supracondylar fractures in good position. The shortening averaged 6 cm. and coxa vara was seen in all cases. In retrospectively, we concluded that this was a most unsatisfactory management protocol.

Group II

Six cases were treated by a combination of non-operative management of the femoral neck fracture, and internal fixation of the shaft. In four cases, the neck fracture had been missed initially, and on late diagnosis, operative intervention was not warranted due to adequate union or good position. The other two cases were undisplaced basal fractures. The average shortening at final follow up was just 1.6 cm, due mostly to the accurate reduction of the shaft fracture, and the relatively undisplaced nature of the neck fracture.

Group III

Three cases were treated by a protocol combining McMurray's osteotomy for the femoral neck and internal fixation for the shaft fractures. In one case the neck fracture had been missed initially, and in another case McMurray's osteotomy was done as a secondary procedure; in one case it was done at the time of femoral shaft fixation. In this group, one

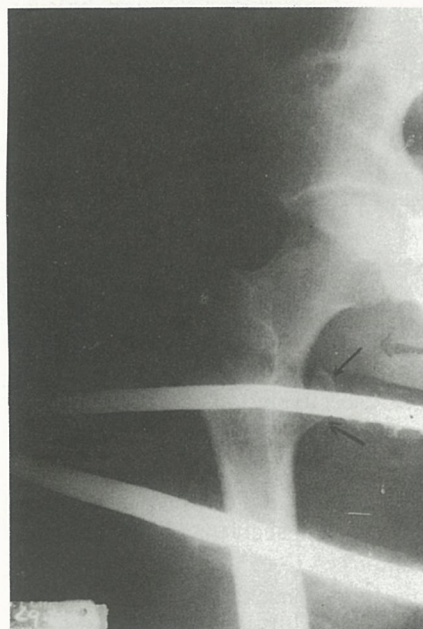


Fig. 2 (a) AP view of the right hip showing trochanteric (Tronzo type-II) fracture.



Fig. 2 (b) AP view of the ipsilateral femur showing comminuted mid shaft fracture

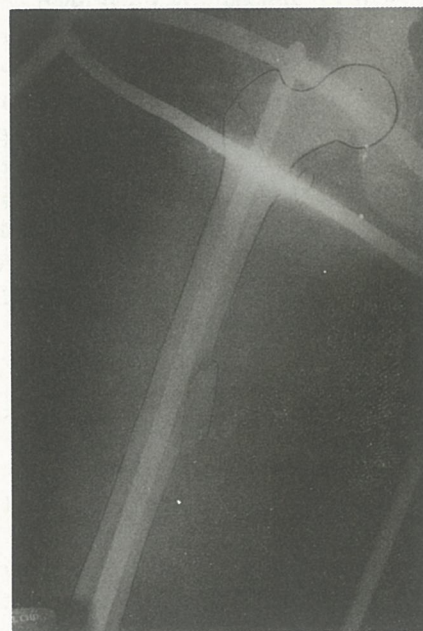


Fig. 2 (c) Same case after open reduction of both fractures and fixation with a Kuntscher Nail.

femoral neck fracture did not unite and the average shortening was 2.5 cm. We have now abandoned this management protocol.

Group IV

Eleven cases were treated by internal fixation (table II). This was done simultaneously in nine cases, and in two cases, the femoral neck fracture was fixed on priority and the shaft fracture was fixed subsequently (Fig. 2). In three cases, significant delay between injury and operation prompted us to employ bone grafting procedures for the femoral neck (Fig. 3). The average shortening in these cases was 1.2 cm only and there was no malunion or coxa vara.

The average age of our patients was 38.9 years (range 20 to 70 years). The three cases of trochanteric fracture were 60, 42 and 40 years respectively. There were twenty males and four females. Twenty two patients were involved in road accidents, while two cases had a fall from height. The average time to full weight bearing was 7.1 months, and the earliest weight bearing was possible in cases where both fractures were treated by stable internal fixation. The right side was involved in nineteen cases and in five cases the left side.

Assessment of fracture patterns revealed a predominance of basal fractures of the femoral neck (10 type III, 1 type IV and 4 type II) followed by transcervical fractures (2 type II, 3 type III, and 1 type IV); there were 3 trochanteric fractures (2 Tronzo II and 1 Tronzo V fracture). There was no case of AVN of the head, and one intracapsular fracture did not unite in spite of McMurray's osteotomy. Assessment of femoral shaft fractures revealed twenty midshaft fractures with varying grades of comminution (No comminution in 2 cases,

Grade I in 6, Grade II in 8, and Grade III in 4). One shaft fracture was in the lower third and there were three supracondylar fractures (1 severely comminuted). One femoral shaft fracture had delayed union and required subsequent bone grafting. Two of the fractures were compound injuries, which lead to delay in primary internal fixation.

DISCUSSION

Analysis of our results revealed that a majority of our cases were males (83.3%) and the right limb was predominantly involved (19 out of 24 cases). This is easily explained in India the motor vehicles drive on the left hand side of the road and any head on collision between two vehicles naturally involves more of the right side in both. This association between the side of injury and traffic regulations has not been pointed out before although the right leg has been shown to be involved twice as frequently as the left¹⁴.

The average age of our patients was 38.9 years, making this an injury localized mainly to the young adult population. We observed that the association of trochanteric fractures with femoral shaft fractures was seen at a relatively higher age group than intracapsular femoral neck fractures. Another finding of note was that the degree of comminution of the shaft, or the extent of displacement of the femoral neck, was not a true reflection of the severity of the overall injury. This is done to the fact that the traumatizing force dissipates its energy at two levels rather than one, and hence both of them are not so severely damaged. This was also corroborated by the low incidence of compound femoral shaft fractures in spite of associated open fractures elsewhere. It may also be an important reason why none of our cases developed avascular necrosis of the femoral head, despite a wide array of treatment methods employed.

A review of the world literature (Table 2) revealed few reports of this problem injury. As many as eleven series out of twenty six (encompassing 130 cases out of a total of 216) were published in the last fifteen years. To our mind, this reflects both an increasing awareness of this complicated injury as well as a higher incidence due to high velocity trauma. In our series, one case of femoral neck fracture was missed initially even after we had reported this injury previously. Although the mistake was rectified early, and adequate treatment rapidly employed, this goes to further emphasize the fact that a high index of suspicion and routine pelvic x-rays in all polytraumatic cases is the only way to avoid such lapses.

The problem of management has become less controversial, and various authors have now recommended prompt internal fixation of both the fractures^{1,6,14,23,24,29}. Some authors have advocated fixation of the femoral shaft first¹² as it facilitates reduction of the neck fractures. Others have said that the neck fracture is an emergency^{23,24} and should be fixed first. A management protocol which advocated closed nailing of the femoral shaft and compression screw fixation of the femoral neck has given good results²⁴. At our institute, we treated three



Fig. 3 (a) X-ray photograph (A.P. view) showing basal (Garden-II) femoral neck fracture with ipsilateral femoral shaft fracture.



Fig. 3 (b) Same case after fixation of femoral shaft with A.O. Dynamic Compression Plate and femoral neck by free fibular graft and compression screw.

cases with McMurray's osteotomy and fixation of the shaft as many surgeons in India were using (and some are still using McMurray's osteotomy), as a primary treatment for the management of femoral neck fractures. We have now abandoned this technique and consider this concept outdated. We advocate primary open reduction and internal fixation of neck fractures, preferably by the anterolateral approach to minimize damage to the blood supply of the femoral head. In addition, all delayed cases should be treated by supplemental bone graft,

either in the form of a sartorius muscle pedicle, or preferably as a free fibular graft³⁰. This helps in union and aids in the revascularization of the femoral head. For the femoral shaft fracture, we advocate fixation with a dynamic compression plate, as the degree of comminution and displacement is usually not severe. This procedure does not necessitate the use of an image intensifier (which is needed for closed femoral nailing), and can be done at most centres even in under developed countries.

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