THE ANALYSIS OF THE TWELVE REOPERATED FEMORAL NECK FRACTURES

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ABSTRACT

Out of one hundred and sixty-two femoral neck fractures, twelve reoperative cases were analysed and discussed relating to the causes of the reoperation. The twelve patients were consisted of eleven females and one male. The age distribution ranged from 60 years to 72 years, average age being 65 years. The internal fixations were performed by Smith-Petersen nail, multiple pinning with K-wires, hip plate and A-O screw.

Most important factor required reoperation was a poor reduction of the fracture. Other factors leading to reoperation were early weight bearing and inadequate selection of the fixation materials.

INTRODUCTION

Since the first introduction of Smith-Petersen nail in 1931, many new operative methods for the femoral neck fracture have been reported. This fracture, however, still remains a serious problem in view of the satisfactory end-result.

We have previously reported one hundred and sixty-two femoral neck fractures over sixty years of age and have suggested the relation between the method of the treatment and their prognoses. The purpose of this paper is to analyse the twelve reoperated femoral neck fractures and to clarify the causes of the reoperation.

MATERIALS

Out of one hundred and sixty-two femoral neck fractures, twelve cases were reoperated: eleven females and one male. The age distribution ranged from 60 years to 72, average age being 65 years.

The internal fixation was performed by Smith-Petersen nail in five cases,
Table 1

<table>
<thead>
<tr>
<th>Case</th>
<th>Age</th>
<th>Sex</th>
<th>Preop Displacement</th>
<th>X-ray findings</th>
<th>Initial operation</th>
<th>Second operation</th>
<th>Assessment*</th>
<th>Causes of the reoperation</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. 1</td>
<td>69</td>
<td>♀</td>
<td>(++)</td>
<td>(+)</td>
<td>70°</td>
<td>Multiple pinning</td>
<td>Vitallium Prosthesis</td>
<td>68 points</td>
</tr>
<tr>
<td>No. 2</td>
<td>62</td>
<td>♀</td>
<td>(+)</td>
<td>(+)</td>
<td>58°</td>
<td>Multiple pinning</td>
<td>Vitallium Prosthesis</td>
<td>58 points</td>
</tr>
<tr>
<td>No. 3</td>
<td>68</td>
<td>♀</td>
<td>(+)</td>
<td>(+)</td>
<td>60°</td>
<td>Multiple pinning</td>
<td>Vitallium Prosthesis</td>
<td>72 points</td>
</tr>
<tr>
<td>No. 4</td>
<td>63</td>
<td>♀</td>
<td>(+)</td>
<td>(-)</td>
<td>60°</td>
<td>Smith-Petersen nail</td>
<td>Vitallium Prosthesis</td>
<td>69 points</td>
</tr>
<tr>
<td>No. 5</td>
<td>67</td>
<td>♀</td>
<td>(+)</td>
<td>(+)</td>
<td>36°</td>
<td>Smith-Petersen nail</td>
<td>Bone Graft</td>
<td>71 points</td>
</tr>
<tr>
<td>No. 6</td>
<td>65</td>
<td>♂</td>
<td>(+)</td>
<td>(-)</td>
<td>58°</td>
<td>Smith-Petersen nail</td>
<td>Osteotomy with bone graft</td>
<td>89 points</td>
</tr>
<tr>
<td>No. 7</td>
<td>72</td>
<td>♂</td>
<td>(+)</td>
<td>(+)</td>
<td>60°</td>
<td>Smith-Petersen nail</td>
<td>Vitallium Prosthesis</td>
<td>71 points</td>
</tr>
<tr>
<td>No. 8</td>
<td>68</td>
<td>♀</td>
<td>(+)</td>
<td>(+)</td>
<td>35°</td>
<td>Hip plate</td>
<td>Bone Graft</td>
<td>85 points</td>
</tr>
<tr>
<td>No. 9</td>
<td>62</td>
<td>♂</td>
<td>(+)</td>
<td>(+)</td>
<td>60°</td>
<td>Hip plate</td>
<td>Bone Graft</td>
<td>73 points</td>
</tr>
<tr>
<td>No. 10</td>
<td>60</td>
<td>♀</td>
<td>(+)</td>
<td>(-)</td>
<td>45°</td>
<td>A-O screw</td>
<td>Vitallium Prosthesis</td>
<td>73 points</td>
</tr>
<tr>
<td>No. 11</td>
<td>69</td>
<td>♀</td>
<td>(+)</td>
<td>(+)</td>
<td>65°</td>
<td>Multiple pinning</td>
<td>Vitallium Prosthesis</td>
<td>71 points</td>
</tr>
<tr>
<td>No. 12</td>
<td>62</td>
<td>♀</td>
<td>(+)</td>
<td>(+)</td>
<td>42°</td>
<td>Smith-Petersen nail</td>
<td>Acryl Prosthesis</td>
<td>100 points</td>
</tr>
</tbody>
</table>

*According to scoring by The Japanese Orthopaedic Association*
multiple pinning with K-wires in four, plate fixation in two and A-O screw in one.

Pauwels' angles were 70 degrees in one patient, from 69 to 60 degrees in five, from 59 to 50 degrees in two and under 49 degrees in four. All cases that exceeded 55 degrees of Pauwels' angle indicated severe displacement of the femoral neck fracture. The reoperated cases were the femoral neck fracture with severe displacement and/or with Pauwels' angle of over 55 degrees.

Several cases by the different way of fixation are summarised in the following (Table 1).

1. Smith-Petersen nail

Case 1—Four weeks prior to admission, a woman aged sixty-seven years with rheumatoid arthritis had pain suddenly in the left hip accompanied by loss of walking ability. X-ray of her left hip revealed subcapital fracture of the femur with 36 degrees of Pauwels' angle. The distal fragment displaced inwards moderately.

Soon after admission closed reduction and internal fixation by Smith-Petersen nail was performed. Since the loosening of the nail was found four weeks postoperatively, removal of the nail and bone graft were carried out (Fig. 1).
Case 2—A woman aged seventy-two years fell down from stairs two days prior to admission and had pain in the right hip. X-ray of her right hip revealed the subcapital fracture of the femur with 60 degrees of Pauwels’ angle.

The distal fragment displaced inwards markedly, closed reduction and internal fixation by Smith-Petersen nail was performed. Four weeks postoperatively X-ray showed the bone absorption of the femoral neck and the loosening of the nail, therefore the femoral head was replaced with a Vitallium prosthesis (Fig. 2).

![Pre-op, Reop, 1 y 6 mos post-reop](image)

Case 3—A woman aged sixty-two years had pain in the left hip after she fell on the floor. X-ray of her left hip revealed the subcapital fracture of the femur with 42 degrees of Pauwels’ angle. The distal fragment displaced inwards severely. Ten days after accident closed reduction and internal fixation by Smith-Petersen nail was performed. Six months after surgery X-ray revealed the pseudarthrosis associated with the shortening of the femoral neck and the loosening of the nail.

This is thought to be cause by early weight bearing. The femoral head was replaced with an Acryl Prosthesis. For the last ten years following reoperation she has had no pain in the left hip and been caring out her activities of daily living without any difficulty (Fig. 3A-B).

2. Multiple Pinning with K-wires

Case 6—A woman aged sixty-nine years had pain in the left hip after she...
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fell on the street. X-ray of her left hip revealed the subcapital fracture of the femur with 65 degrees of Pauwels' angle. The distal fragment displaced inwards
moderately. Two days after accident closed reduction and internal fixation by six 1.8 mm-diameter K-wires was performed.

Five weeks postoperatively the pseudarthrosis of the femoral neck accompanied by the shortening of the femoral neck and extrusion of Pins were found and the femoral head was replaced with a Vitallium prosthesis (Fig. 4).

Case 7—Nine days prior to admission a woman aged sixty-nine years had pain in the left hip after she fell on the floor. X-ray of her left hip reveals subcapital fracture of the femur with 70 degrees of Pauwels’ angle.

The distal fragment displaced inwards moderately. Closed reduction and internal fixation by six 2.0 mm-diameter K-wires was carried out.

Since the pseudarthrosis of the femoral neck was found one year postoperatively the femoral head was replaced with a Vitallium prosthesis (Fig. 5, 5B).

3. A-O Screw

Case 12—A woman aged sixty years had pain in the right hip after she fell on the floor. X-ray of her right hip revealed subcapital fracture of the femur with 45 degrees of Pauwels’ angle.
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Pre-op 6 mos post-op 10 mos post-op
Fig. 5A

Reope 7 mos post-reop 1 y 6 mos post-op
Fig. 5B
Pre-op  2 mos post-op  5 mos post-op

Fig. 6A

Fig. *B
The distal fragment displaced inwards moderately, closed reduction and internal fixation by three A-O screws was carried out. Since the pseudarthrosis of the femoral neck was found one year postoperatively the femoral head was replaced with a Vitallium prosthesis (Fig. 6A, 6B).

DISCUSSION

The analysis of the femoral neck fracture fixed by Smith-Petersen nail showed several demerits concerning to it's fixing ability. These are ① it was difficult to insert the nail into the adequate position and to reinsert, if necessary, ② in spite of proper positioning of the nail the separation of the fracture site was caused by the nailling. ③ Smith-Petersen nail was occasionally found to be displaced even after sufficient fixation.

The cases fixed by multiple pinning were analysed as follows: ① cases fixed by open pinning showed better stability than those by closed pinning. ② multiple pinning with tinny pinns occasionally occurs the redisplacement postoperatively. ③ four or five 3 mm-diameter pinns should be used to prevent the postoperative displacement of the fragment.

The cases fixed by A-O screws were found as follows: ① A-O screw should be used to apply the adequate compression force to accelerate bone union for the fracture site. ② it was very difficult to insert technically a few A-O screws in proper position. ③ A-O screws are stable enough to be extruded through the femoral head or neck if the shortning of the femoral neck took place.

As Garden (1964)6,7,8,9 and many others emphasized the importance of the reduction in the femoral neck fracture, most important factor required reoperation was attributed to the poor reduction of the femoral neck fracture showing an incidence of 66 per cent in our reoperative cases.

SUMMARY AND CONCLUSIONS

1. Of one hundred and sixty-two femoral neck fractures, twelve reoperative cases were analysed and discussed relating to the causes of the reoperation.

2. Most important factor required reoperation is the poor reduction of the fracture.

3. It is thought that other factors leading to the reoperation are early weight bearing and the inadequate selection of the fixation material.
REFERENCES