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The results of conservative and surgical treatment of tibial plateau fractures

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Tibia plato kırıklarının cerrahi ve konservatif metodlarla tedavisi ve sonuçları

Sağlık Bakanlığı Şişli Etfal Hastanesi Ortopedi ve Travmatoloji Kliniği'nde 1984-1990 yılları arasında 35 tibia plato kırığı olgusu tedavi edildi. Olguların 13'ü kadın, 22'si erkekti. Hohl sınıflamasına göre tiplendirilen olgulardan; 6 olgu Tip I, 3 olgu Tip II, 11 olgu Tip III, 4 olgu Tip IV, 1 olgu Tip V, 10 olgu cerrahi olarak tedavi edildi. Değerlendirmede ağrı, yürüme kapasitesi, total diz hareketleri ve stabilite kriter olarak alındı. Her iki tedavi metodunun sonuçları tatminkar olarak bulundu.

Anahtar kelimeler: *Tibia plato kırıkları, konservatif ve cerrahi tedavi*

35 cases of tibial plateau fractures have been treated in the department of Orthopedics and Traumatology at Şişli Etfal Hospital. 13 cases were females and 22 were males. The types of the cases were determined according to Hohl classification, that is, there were 6 cases of Type I, 3 cases of Type II, 11 cases of Type III, 4 cases of Type IV, 1 case of Type V, 10 cases of Type VI. While 22 cases have been treated conservatively, 13 of cases were surgically treated. Pain, walking capacity, total range of knee motion and stability formed the criteria of evaluation. Results of both treatment methods were found to be satisfactory.

Key words: *Tibia plateau fracture, conservative and surgical treatment*

Tibial plateu fractures are frequent and may lead to joint stiffness, angular deformities, instabilites, post-traumatic arthritis, limitation of extension, pain and muscular weaknees (4, 6, 8, 11). In the treatment of tibial plateau fractures, there are different methods with their different results but none of them are supported by most of the authors yet (1, 2, 7, 9, 12). In long-standing follow up series, it is reported that although anatomic and radiologic results of these fractures are poor, fairly good functional results are obtained by conservative treatment. In addition, operative methods influence these results positively (1, 2, 4, 5, 9). In the present series, results of conservative and surgical treatment of tibial plateau fractures treated in our cases are studied under the light of literature.

Patient and methods

Between the years 1984-1990, 35 cases of tibial plateau fractures were treated in our clinics. The average age was 43.3 (ranged from 14 to 85). There were 22 males and 13 females. The mechanisms of injury were traffic accidents in 24, fall on a level surface in 10 and direct trauma in 1 of the cases. According to Hohl Classification, 6(17.2 %) were Type 1, 3 (8.6%) were Type II, 11 (31.5%) were Type III, 4(11.4%) were Type IV, 1 (2.8%) was Type V and 10 (28.5%) were Type VI (Table 1).

Type	I	6	(17.2 %)
Type	II	3	(8. 5%)
Type	III	11	(31. 5%)
Type	IV	4	(11. 4%)
Type	V	1	(2. 8%)
Type	VI	10	(28. 5%)

Table 1:Distribution of tibial plateau fractures according to Hohl classification

According to compression and displacement, there were 22 (62.8 %) lateral condyle, and 10 (28. 6%) bicondyler fractures (Table 2).

Lateral	22	(62. 8%)
Medial	3	(8. 5%)
Bicondylar	10	(28. 7%)

Table 2: Classification of fracture type in tibial condylar fractures

Radiologically, there were compression of 0-5 mm in 21 cases, 5-10 mm in 12 cases, more than 10 mm in 2 cases and condyler displacement of more than 3 mm in 8 cases.

In this series, 22 of 35 cases (62. 9%) were treated conservatively and 13 (37. 1%) were treated surgically. 17 (48. 16%) of 22 conservatively treated patients were treated by primary closed reposition and circular casting, and 5 (14. 3%) were treated by supramalleolar skeletal traction followed by circular casting. Of the 13 surgically treated patients simple scre-

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wing techniques in 2 (5. 7%) and condylar plate and rigid osteosynthesis in 11 (31. 7%) case were applied. In addition, lateral meniscectomy in 2, repair of intercondylar eminentia in 1 and joint surface elevation in 2 cases were aplied. In 7 (20 %) cases anatomic reposition could not be obtained.

Immobilization was applied for 4-10 weeks (average 6. 6 weeks) in conservative and for 3-6 weeks (average 5 weeks) in surgical cases. In both groups weight bearing was allowed after 2-4 months (average 3 months).

Results

Periods of follow up was from 6 months to 32 months (average 12. 2 months). The end results were graded on the basis of pain, walking capacity, total ROM of knee and stability. Clinically patients with little or no pain, walking without any support, and having flexion not less than 100 degrees (no limitation to extension or if present more than 10 degrees) and having complete stability were regarded as satisfactory. The rest of the patients were regarded as unsatisfactory. In the follow up study, 5 (14. 3%) patients had pain, 3 (8. 6%) had more than 10 degrees of limitation for extension, 4 (11. 4%) had flexion less than 100 degrees and 2 (5. 7%) had instability. 16 (72. 7%) of 22 conservative group and 9 (69. 2%) of 13 surgical group were concluded as satisfactory.

Discussion

The goal in the treatment of intraarticular fractures is to restore stability, eliminate pain and maintain normal joint functions. Although is not always possible, functional results are fairly good (5, 9, 10). Various conservative and surgical methods are used for the treatment of plateau tibial fractures. The satisfactory results can be obtained by different authors are as follows: Apley by using skeletal traction followed by circular cast in 75 % (1), Drennan, by primary closed reposition and circular cast in 85 % (2) and Scotland, Wardlaw and Sarmiento, with cast brace in most of his cases (1, 10). In displaced fractures, Hohl and Luck obtain satisfactory results in 47-74 % according to fracture type and the method used (4). Blokker obtain 82 % good results with closed methods and 70 % with surgical methods (1). Recently, Schatzker and Waddell stated that for the anatomic reposition of joint surface the best results can be obtained by open reduction and internal fixation (1, 11). Rasmussen reported that fairly good results were obtained in 95 % of conservatively treated patients and in 80 % of complicated fractures treated surgically (Table 3).

In our series we obtain 72. 7% fairly good results in conservative group and 69. 2% in surgical group. The differences of fractures that are controversial

	Conservative		Surgical
Apley	75 %		-
Drennan	85 %		-
Blokker	82 %		72 %
Hohl		47-74 %	
Rasmussen	95 %		80 %
Kuzgun	72. 7%		69. 2%

Table 3: Good results related to treatment method

open reduction and fixation is recommended if there is residual displacement of more than 1 mm (Burry 1), 4 mm (Gausewitz 3), 5 mm (Blokker and Hohl 1, 4), 10 mm (Waddell 1). Drennan recommended surgery, if reduction is not adequate in displaced and split compression fractures (2). According to Rasmussen, Lansinger and Moore, knee instability is an indication for surgical treatment (7). Sarmiento on the other hand, pays attention to proximal fibular fractures for the choice of treatment method. He offers surgery in displaced lateral condyle fractures with proximal fibular fractures. He also offers internal fixation in medial condyle fractures independent of the fibular fractures, because weight bearing will otherwise produce varus deformity. In bicondylar fractures, even if the fibula is intact, surgical therapy is offered due to the tendency of medial condyle to displace.

After Hohl and Luck, early mobilization in plato tibial fractures is supported by many other authors (1, 3, 4, 7, 9, 10). Early mobilization as assumed to increase neochondrogenesis (1, 2, 4).

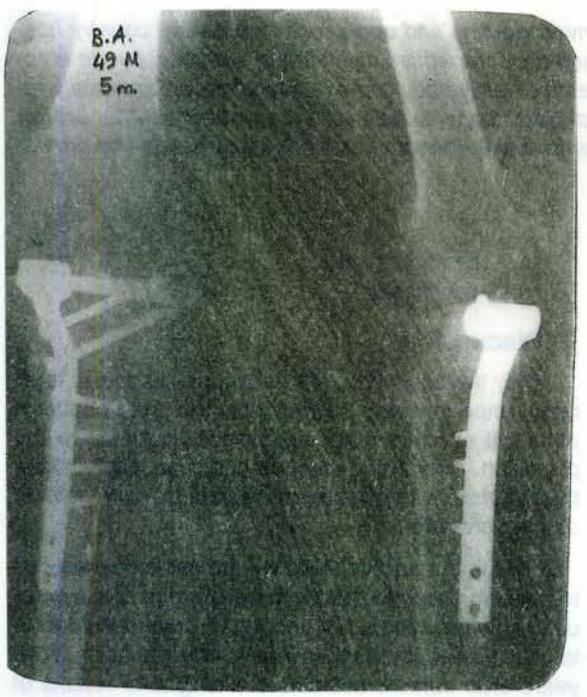
Blokker 2, Moore, Drennan and Rasmussen 6, Hohl 5-6, Waddell 8 and Apley recommended 12 weeks of immobilization respectively. Gausewitz recommends 2 weeks of immobilization for nondisplaced fractures and 2-6 weeks for displaced ones (3). Sarmiento on the other hand, used brace for 5 weeks following 3 weeks of immobilization and weight bearing can be achieved (10) (Table 4).

	Immobilization time (week)	Weight bearing time (week)
Blokker	2	6
Sarmiento	3	8
Hohl	5-6	12-24
Rasmussen	6	8-10
Moore	6	-
Drennan	6	-
Lansinger	6	12
Kuzgun	6.6	12

Table 4: Immobilization and weight bearing time of some authors

The time of weight bearing is also debatable. Blokker recommends weight bearing as early as 6 weeks in order to trigger healing process by compression as he assumed (1). Lansinger allows weight bearing at 12 weeks (5). Rasmussen allows partial weight bearing at 8 weeks and complete assumes that the degree of depression and persistant angular deformity increases by weight bearing so that he al-

Case 1. Fig. A: Preoperative roentgenogram showing Type VI fracture



Case 1. Fig. B: Appearence at five months follow-up. The fracture was treated surgically with buttress plate and screws.

lows weight bearing as late as possible (after 3-6 months).

In conclusion, for the adequate treatment of plateau tibial fractures anatomic reposition and soft tissue repairment should be achieved as much as possible. Besides, early mobilization and late weight bearing contribute to the end results.

Case 1. Fig. C: Six months after injury. The roentgenograms showing the final result after the exraction of the fixation material

References

1. Blokker, C. P., Rorabeck, C. H., Bourne R. B.: Tibial plateau fractures. Clin Orthop. 182: 193-194, 1984.
2. Drennan, D. B., Locher, F. G., Maychan D. J.: Fractures of the tibial plateau J. Bone Joint Surgery vol. 61-A: 7 989-995, 1979.
3. Gausewitz, S., Hohl, M.: The significance of early motion in the treatment of tibial plateau fractures. Clin. Orthop. 202: 135-138, 1986.
4. Hohl, M.: Tibial condylar fractures J. Bone and Joint Surgy. Vol. 149-A: 7 1455-67, 1967.
5. Lansinger, O., Bergman, B., Korner, L., Anderson, G.B.J.: Tibial condylar fractures. J. Bone and Joint Surg. Vol. 68-A: 1 13-19, -1986.
6. Locht, R.C., Gross, A.E., Langer, F.: Late osteochondral allograft resurfacing for tibial plateau fractures. J. Bone and Joint Surg. Vol. 66-A 3, 328-335, 1984.
7. Moore, T.M.: Fracture dislocation of the knee Clin. Orthop. 165 128-140, 1984.
8. Rockwood, C. A., Green, D. P.: Fractures in adult. J. B. Lippincott Companyl 453-75, 1984.
9. Rasmussen, P. S.: Tibial condylar fractures J. Bone and Joint Surg. Vol. 55-A p: 1331-1350, 1973.
10. Sarmiento, A., Kınman, P. B., Latta, L. L.: Fractures of the proximal tibia and tibial condyles Clin. Orthop. 145: 136-145, 1979.
11. Schatzker, J., Schulak, D. J.: Pseudoarthrosis of a tibial plateau fractures Clin. Orthop. 145: 146-49, 1979.
12. Segal, D., Franchi, A. V., Campinale, J.: Iliac autograft for reconstruction of severly depressed of a lateral tibial plateau. J. Bone and Joint Surg. Vol. 67-A: 8, 1270-1272, 1985.

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