The Importance of Early Physical Therapy in Tibial Plateau Fracture: A Case Report

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Abstract: *Introduction:* Tibial plateau fractures are complex condition that affect functional knee movement. The case report would draw attention to the importance of early physical therapy in these cases.

Case report: A 33-year-old Brazilian man, had a motorcycle accident that resulted in a right tibial plateau fracture. After three months post-op of osteosynthesis patient came to start the rehabilitation process.

Results: During the physical therapy evaluation, we observed an important capsular restriction with reduction of the motion range (just 15º right knee flexion), and muscular hypotrophy of right lower limb. Late rehabilitation process included: active and passive mobilization of knee; progressive discharge of weight in right lower limb; progressive muscle strengthening of the right lower limb and proprioceptive training. After three months of rehabilitation, we observed little improvement in knee range of motion (35º right knee flexion), and improvement of muscle strength and gait.

Conclusion: In Brazil, motorcycle accidents that result in the fracture of the lower limb are frequent. In this report, the difficulties and complications of the late rehabilitation process were observed. This case report seeks to draw attention to the future inclusion of physical therapy in hospital routines, along with the referral of patients to early clinical rehabilitation process with the objective of obtaining optimal recovery of these patients.

Keywords: Physical therapy, Tibial plateau fracture, Knee, Rehabilitation.

INTRODUCTION

Tibial plateau fractures are a complex condition that are typically caused by high energy trauma that involves mainly young adults. These fractures affect knee alignment, stability, and motion. Appropriate treatments are critical for minimizing patient disability and posttraumatic arthritis. In more complex tibial plateau fractures, sequential treatment with external fixation followed by internal fixation is recommended. Stable fixation and early painless joint movement are correlated to a better prognosis [1-3]. In Brazil, the incidence of fractures and hospital admissions increased in the last few years due to traffic accidents causing significant morbidity and mortality in the population. The accidents occur mainly in men, young adults and motorcyclists [4].

The rehabilitation process involves: reduction of pain and swelling, painless mobilization to range of motion (ROM), muscle strengthening with or without electrostimulation, and proprioception training. In the beginning of the rehabilitation process it is necessary to be conscientious of the loading capacity of the biological plate, until radiological signs of bone healing via callus formation is indicated. It is recommended that rehabilitation start early; latest being three weeks after osteosynthesis to avoid restriction of movement and loss of muscle mass [5-7]. The aim of the present study is to highlight the importance of physical therapy with early rehabilitation in the treatment of the tibial plateau fracture.

CASE REPORT

A 33-year-old Brazilian man suffered from a right tibial plateau fracture following a motorcycle accident. First, the tibial plateau fracture was treated by external fixation for two weeks. Second, the fragments were internally fixed with plate and screw. After one week of surgery, the patient was diagnosed with pulmonary thromboembolism; following the medical treatment to resolve the embolism. The present study was approved by the Research Ethics Committee of the Sao Camilo University Center (Protocol no 03989718.6.0000.0062), in accordance with Brazilian National Health Council Resolution 466/12.

Patient arrived at physiotherapy after three months of surgery with significant restriction of right knee movement (15º right knee flexion) and muscular hypotrophy of right lower limb; with swelling and increased tissue temperature on the right knee. The

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patient had no neurological symptoms. The patient arrived at physical therapy with axillary crutch and with partial discharge of weight in the right lower limb. The muscle strength was measured by Kendal test [5], perimetry/circumference was measured by tape and range of motion was measured by goniometer (Table **1**). See the fracture and osteosynthesis in Figure **1**.

Late rehabilitation included active and passive mobilization of knee; progressive discharge of weight in right lower limb; progressive muscle strengthening of the right lower limb and proprioceptive training. Treatment was performed three times per week for three months. After three months of rehabilitation (Table **1**), we observed little improvement in knee range of motion (35º right knee flexion); partial gain of hypertrophy and strength; and limited mobility during the gait with the need to use a walking stick.

DISCUSSION

The present case reports a 33-year-old Brazilian man with tibial plateau fracture due to motorcycle accident. The fracture was treat with osteosynthesis. The patient sought out physical therapy service after three months of surgery with important functional deficit. During the physical therapy evaluation, we observed important restriction of right knee motion, swelling, muscular hypotrophy and change in the gait. The patient reported that he did not perform physical therapy until that moment. We propose a 3-month late rehabilitation program with mobilization of knee, progressive muscle strengthening, proprioceptive and gait training. After the rehabilitation program we observed improvement in strength and gain, but very little improvement in knee range of motion. One possible hypothesis is that the joint capsule became thicker and denser due to the size of the lesion and the

Table 1: Data of Muscle Strength, Perimetry and Range of Motion

Evaluation date Variables	March 15, 2018 Perimetry (cm)		June 15, 2018 Perimetry (cm)	
	Right	Left	Right	Left
20 cm (above)	49	52	50	52
15 cm	46	47	48	48
10 cm	43	43	44	46
5 cm	41	39	42	42
Popliteal line	40	38	40	39
5 cm	38	34	39	36
10 cm	38	36	39	38
15 cm	37	37	38	39
20 cm (below)	32	32	34	36
Variables	**Range of Motion (angles)**		**Range of Motion (angles)**	
Knee flexion	20	130	35	130
Knee extension	-10	0	-10	0
Dorsiflexion	10	30	22	30
Plantar flexor	12	40	28	40
Variables	**Muscle Strenght (points)**		**Muscle Strenght (points)**	
Hip Flexion	3	5	4	5
Hip Extension	3	5	4	5
Hip Abduction	4	5	5	5
Hip Adduction	4	5	5	5
Knee flexion	3	5	4	5
Knee extension	3	5	4	5
Plantar flexor	3	5	4	5
Dorsiflexion	4	5	5	5

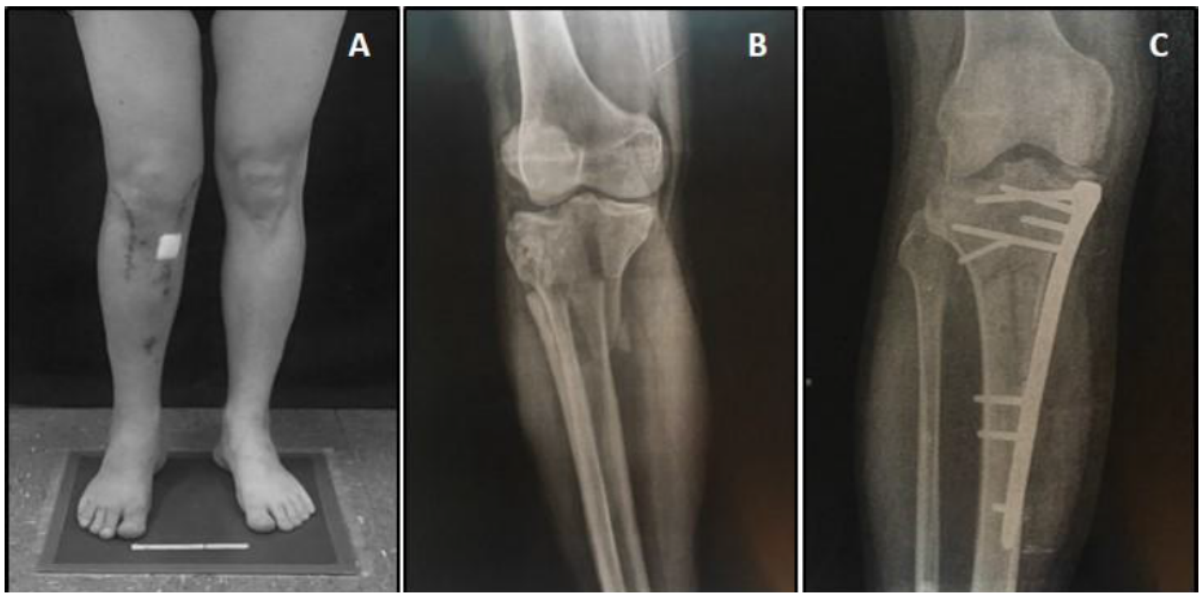

Figure 1: A = Anterior view of the patient's lower limbs at the start of rehabilitation; **B** = Radiograph of the right knee with tibial plateau fracture; **C** = Radiograph of the right knee after fracture reduction and osteosynthesis.

immobilization time. Previous studies showed increased synovial thickness, increased cellularity, as well as thickening of fibrous tissue due to arthroscopic and total knee arthroplasty [9, 10]. In an animal model, an increase in the cellularity and thickness of the tissues surrounding the knee joint was observed after 1 week of immobilization. The capsule fibrosis with overexpression of type I collagen and increase in myofibroblasts is related to the mechanism of joint capsule fibrosis [11]. This information reinforces the need for physical therapy with early mobilization to avoid the functional complications due to prolonged immobilization.

Some studies have showed the importance of early physical therapy interventions and the monitoring of the functional conditions of patients with knee injuries. Thus, the importance of impairment assessment in range of motion, motor control, strength, endurance and gait should be considered at the post-operative moment. In this sense, manual therapy, passive mobilization, progressive muscle strength training and gait training need to be considered in the early rehabilitation process of knee injury [12-16].

In conclusion, tibial plateau fractures occur commonly in young adults because of motorcycle accidents in Brazil [4]. This situation points to the need for educational programs to prevent motorcycle accidents [17]. The current study suggests that prolonged immobilization has bad effects on periarticular tissue, which may have implications for pain and functional recovery after tibial plateau fracture. Early processes of rehabilitation can avoid these complications and obtain better outcomes in patient recovery.

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