

The prognosis of management following tibial plateau fractures

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2 ABSTRACT

Background. Tibial plateau fractures (TPF) consist for one percent of all fractures treated.

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Open-reduction-internal-fixation (ORIF) and re-construction of the articular surfaces are the mainstay for management. In this study, we sought to make an assessment of the risk to capable of identifying cases with great risks for having a bad outcome postoperative.

Methods. Totally 123 tibial plateau fractures treated at Basrah Teaching Hospital were prospectively enrolled. Demography, injuries data, surgical management and SMFA scores were collected. Variables are gender, age, BMI, comorbidity, open fracture, high-energy injury mechanisms, vascular or nerves injuries, residual of TP depression, tibial spine fracture and OTA fracture types.

Results. We recorded morbidity in 55 (44.7%) of cases. Seventy-one patients were smoking. High energy mechanism of trauma was documented in 55.3% whereas low energy found in 44.7% of cases. Compartment syndrome reported in 34.1% of cases. Open fracture was noticed in 32.5% of cases. Tibial spine involved in 29.3% of cases. OTA class (C) was more reported than class (B) (63.4% vs. 36.6%). Residual of tibial plateau depression reported in 43.1% of cases. The preoperative fracture depression range value was 1-39 mm while the postoperative fracture depression range was 0-5.5 mm.

Conclusion. SMFA score use as an assessment tool of the risk for postoperative dysfunction. Elderly, obesity, severe comorbidity, tobacco smoking, alcoholism ingestion, high trauma energy, large postoperative depression, tibial spine involvement, female gender, complicated open fracture, type C fracture and high SMFA score are the predictive risk factors for poor outcome.

Keywords: TPF, Open-reduction-internal-fixation, articular surfaces, fracture depression, OTA class

Introduction

TPF accounted for one percent of all fractures treated, with annual incidence of 10.3/100,000 [1, 2]. ORIF and re-construction of the articular surfaces are the management mainstay [3-5].

In the literature, the most common evaluated outcome is the functional outcomes [6]. Which assessment by questionnaires like the SMFA, SF-36 and KOOS scores. Bad functional outcomes

in the SMFA score associated with poorly clinical prognosis and vice-versa [7-9]. Other tools of interesting are postoperative pain continuity [6], radiographic mal-alignment or fixation failure [10], intra-operative complication, posttraumatic arthrosis development [11] and un-planned re-operation [12].

Several works have determined the functional outcomes postoperative of TPF and recorded risk factors linked with poorly outcomes. The commonest risk factors are older age, mal-alignment of the mechanical tibia axis, fractures classes and decline qualities among others [13-16].

The abilities to investigate poor functional outcomes risk factors are vital to the treatment these injuries as it may facilitate the surgeons to start aggressive and specialized physical therapies for higher risky group of poorly overall outcomes.

Here, we sought to make an assessment of the risk to able of identify cases with great risk for having a bad outcomes postoperative.

METHODS

Study design and setting

Totally 123 tibial plateau fractures treated at Basrah Teaching Hospital were prospectively enrolled. Demography, injuries data, surgical interventions and SMFA scores were collected.

Inclusion criteria

1. ≥ 18 years
2. Tibial plateau fracture

Postoperative therapy

All patients enrolled in a structured physical manage programs at 14 days post-operatively:

- Range motion of knee: Active and graduated passive
- Strengthening of quadriceps and hamstring: Graduated
- Weight bearing: 3 months post-operatively

Outcomes

Poor functional outcome (PFO) is define as any case with a functional SMFA (>10 points) above the median at most recent follow-up visit. That provide a most recent follow up was at least 12 months post operation (>21.4). SMFA scores at this level have been revealed to be one SD $>$ the mean in normative data and linked with worse clinical outcome and capability [7-9].

Data collection

Variables are gender, age, BMI, comorbidity, open fracture, high-energy injury mechanisms, vascular or nerves injuries, residual of TP depression, tibial spine fracture and OTA fracture types.

Statistics

SPSS ver.24 was used for analyzing data. Frequency, range and percent were described variables. Logistic regression was used to predicted risk factor by Odds ratio (OR). P <0.05 and 95% CI were consider significant.

RESULTS

Totally 123 cases were for an average of 19.7 months prospectively followed. Based on our data, a bad functional outcomes at long-term follow-up observed. Age of patients ranged between 19 and 80 years. BMI ranged between 19.8 and 43.1 kg/m². Male to female ratio was 2.15:1. We recorded morbidity in 55 (44.7%) of cases. Seventy-one patients were smoking. About 14.6% of cases were alcoholism. High energy mechanism of trauma was documented in 55.3% whereas low energy found in 44.7% of cases. Compartment syndrome reported in 34.1% of cases. Vascular and nerve injuries recorded in 48.8% and 31.4%, respectively. Open fracture was noticed in 32.5% of cases. Tibial spine involved in 29.3% of cases. OTA class (C) was more reported than class (B) (63.4% vs. 36.6%). Residual of tibial plateau depression reported in 43.1% of cases. The preoperative fracture depression range value was 1-39 mm while the postoperative fracture depression range was (0 - 5.5) mm.

Characteristic		No.	%
Age (years)		19-80	-
BMI (kg/m ²)		19.8-43.1	-
Sex	Males	84	68.3
	Females	39	31.7
Comorbidity	Yes	55	44.7
	No	68	55.3
Smoking	Yes	71	57.7
	No	52	42.3
Alcohol	Yes	18	14.6
	No	105	85.4
Trauma mechanism	High Energy	68	55.3
	Low Energy	55	44.7
Compartment syndrome	Yes	42	34.1
	No	81	65.9
Vascular trauma	Positive	60	48.8

	Negative	63	51.2
Nerves injuries	Positive	39	31.7
	Negative	84	68.3
Open fractures	Positive	40	32.5
	Negative	83	67.5
Tibial spine involvement	Positive	36	29.3
	Negative	87	70.7
OTA class	B	45	36.6
	C	78	63.4
Residual of tibial plateau depression	Yes	53	43.1
	No	70	56.9
Preoperative fracture Depression		1-39 mm	-
Postoperative fracture Depression		0-5.5 mm	-

At long-term follow-up, the poor outcomes were analyzed by logistic regression models listed in table (2). Old age ($p=0.03$), large BMI ($p=0.04$), comorbidity ($p=0.02$), smoking ($p=0.01$), alcoholism ($p=0.03$), trauma mechanism ($p=0.01$), postoperative depression ($p=0.03$), tibial spine involvement ($p=0.02$), female ($p=0.03$), open fractures ($p=0.05$), fracture types ($p=0.001$) and SMFA score ($p=0.02$) were predictive risk factors for poor outcome.

Variables	OR	P-value	95% CI	
Age (years)	0.78	0.03	1.068	5.46
BMI	0.37	0.04	1886	2.809
Comorbidity	0.5	0.02	2.022	4.378
Smoking	1.02	0.01	1.231	5.998
Alcohol	0.81	0.03	0.734	0.989
Trauma mechanism	2.7	0.01	1.777	7.656
Postoperative Depression	0.4	0.03	1.061	1.657
Tibial spine involvement	-1.7	0.02	0.01	0.905
Female Gender	-0.119	0.03	0.197	1.922
Open fracture	0.66	0.05	1.053	2.569
Fracture types	2.706	0.001	1.898	2.514
SMFA Index	0.41	0.02	1.035	1.727

DISCUSSION

The operative fixation aims of TPF are joints stabilization, tibial articular surface reconstruction and early range-of-knee motion promotion.

Here, smoking and alcoholism are the modifiable risky factors. Smoking was documented to have deleterious effects on fractures healings [10]. Smoking and alcohol intake are known to be linked to poorly wounds healings, infections and non-union in fracture [11]. Spine surgery [12] and lower extremity fracture [13] are common non modifiable factors.

Recently, Konda et al. developed targeted algorithms system for direct resources usage in the contexts of orthopedics injuries [14,15].

In this study, elderly, obesity, severe comorbidity, tobacco smoking, alcoholism ingestion, high trauma energy, large postoperative depression, tibial spine involvement, female gender, complicated open fracture, type C fracture and high SMFA score were found to be the predictive risk factors for poor outcome. Although a 10-point differences from the means of SMFA at (1 year) are a reasonable thresholds for the poorer outcomes [7-9], using a greater thresholds (20-points) would providing greater specificities and PPV in-order-to good differentiate cases with significantly post-operative dys-function.

CONCLUSION

SMFA scores can be utilize as an assessment of the risky tool for postoperative dysfunction. Elderly, obesity, severe comorbidity, tobacco smoking, alcoholism ingestion, high trauma energy, large postoperative depression, tibial spine involvement, female gender, complicated open fracture, type C fracture and high SMFA score are the predictive risk factors for poor outcome.

Disclosure

None

Funding support

None

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