An institutional shift to majority acute fixation of bicondylar tibial plateau fractures has not resulted in an increased complication rate as compared to staged fixation

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INTRODUCTION:

Bicondylar tibial plateau fracture management has traditionally involved a period of initial external fixation; however, treatment algorithms continue to evolve. This study looked to determine trends in the percentage of bicondylar tibial plateau fractures undergoing acute definitive fixation, as compared to staged fixation, and to assess clinical outcomes associated with this potential shift.

METHODS:

This retrospective, single-center, cohort study included 265 consecutive operatively managed patients with bicondylar tibial plateau fractures (AO/OTA 41-C) from 2013 to 2022 who achieved at least 6 months of follow-up. Patients were divided into acute ORIF (definitive fixation <72h from injury) or staged ORIF groups for two different time groups (2013-2017, 2018-2022). Trends in rates of acute versus staged fixation and associated post-operative outcomes defined the main outcome measure.

RESULTS:

The rate of acute fixation for bicondylar tibial plateau fractures increased by 68.3% during the two time periods (2013-2017: 43.5% vs 2018-2022: 73.2%, p<0.001). Demographic and health characteristics did not differ between groups, though the 2018-2022 (N=157) group had more complex fracture patterns (41C3: 45.4% vs 64.9%, p<0.01) and the 2013-2017 (N=108) group had higher overall ISS scores ((19.5 vs 16.9, p=0.09). The use of dual surgical approaches decreased 39% between the two time periods. Wound dehiscence and infectious complications were similar between groups. Non-union and secondary soft tissue coverage rates did not differ statistically (1.9% vs 4.5%, p=0.32; 7.4% vs 3.8%, p=0.26).

DISCUSSION AND CONCLUSION: Not all bicondylar tibial plateau fractures are appropriate for acute definitive fixation. However, a marked increase in the rate of acute fixation (43.5% to 73.2%) has not resulted in increased complication rates. Orthopaedic traumatologists may safely have agency to select the fixation strategy they deem reasonable for their specific patient.

Table 1:

Rates of acute versus staged fixation of bicondylar tibial plateau fractures

	2013 to 2017 (N=108)	2018 to 2022 (N=157)	p-value
			<0.001
Staged	56.5%(61)	26.8%(42)	
Acute	43.5%(47)	73.2%(115)	

Table 2:

Comparisons of Demographics Characteristics

	2013 to 2017 (n = 108)	2018 to 2022 (n = 157)	p-value
Age (SD)	49.0(15.9)	49.6(16.4)	0.77
Sex (Male)	62.0%(67)	64.3%(101)	0.70
Body Mass Index (BMI)	28.3(6.2)	29.2(6.1)	0.27
Cardiovascular Disease	9.3%(10)	8.3%(13)	0.78
Peripheral Vascular Disease	1.9%(2)	5.1%(8)	0.17
Respiratory Disease	6.5%(7)	10.8%(17)	0.23
Diabetes Mellitus	12.0%(13)	11.5%(18)	0.89
Hypothyroidism	4.6%(5)	6.4%(10)	0.55
Psychiatric Disease	10.2%(11)	9.6%(15)	0.87
Tobacco Use			0.35
Never	54.2%(58)	63.1%(99)	
Former	13.1%(14)	10.8%(17)	
Current	32.7%(35)	26.1%(41)	
Substance Abuse	7.5%(8)	12.1%(19)	0.22
Immunosuppression	8.4%(9)	7.0%(11)	0.67

Table 3:

Bivariate Comparisons of Injury/Fracture Characteristics

	2013 to 2017 (n = 108)	2018 to 2022 (n = 157)	p-value
Mechanism of Injury			0.43
MCV/MCC	42.6%(46)	47.8%(75)	
Pedestrian struck	15.7%(17)	8.9%(14)	
Fall from Height	13.9%(15)	12.7%(20)	
Ground level fall	25.9%(28)	26.8%(42)	
Other	1.9%(2)	3.8%(6)	
OTA classification			<0.01
41C1	32.4%(35)	25.6%(40)	
41C2	22.2%(24)	9.6%(15)	
41C3	45.4%(49)	64.9%(102)	
Laterality			0.18
Left	61.1%(66)	49.7%(78)	
Right	37.0%(40)	47.1%(74)	
xcBilateral	1.9%(2)	3.2%(5)	
Open Fracture (Yes)	23.1%(25)	14.1%(22)	0.06
Gustillo Anderson Class			0.54
I	16.06%(4)	22.7%(5)	
II	40.0%(10)	22.7%(5)	
IIIA	24.0%(6)	36.4%(8)	
IIIB	8.0%(2)	13.6%(3)	
IIIC	12.0%(3)	4.5%(1)	
Head Injury	16.7%(18)	4.5%(7)	<0.001
Chest Injury	22.2%(24)	12.7%(20)	0.04
Abdominal Injury	13.9%(15)	7.6%(12)	0.10
Spinal Injury	9.3%(10)	6.4%(10)	0.38
Other MSK	47.2%(51)	43.3%(68)	0.53
Injury Severity Score	19.5(13.4)	16.9(10.8)	0.09
Incision Approach			0.01
Single	38.0%(41)	55.4%(87)	
Dual	62.0%(67)	44.6%(70)	

Table 4:

Bivariate Comparisons of Complication Rates

	2013 to 2017 (n = 108)	2018 to 2022 (n = 157)	p-value
Wound Dehiscence	9.3% (10)	8.3% (13)	0.83
Superficial Infection	5.6 %(6)	5.1%(8)	0.99
Deep Infection	6.5%(7)	9.0%(14)	0.50
Non-Union	1.9%(2)	4.5%(7)	0.32
Secondary Soft Tissue Coverage	7.4%(8)	3.8%(6)	0.26
Conversion to TKA	2.8%(3)	5.1%(8)	0.53
Amputation	0.9%(1)	0.6%(1)	0.99
Mortality	4.6%(5)	2.6%(4)	0.49
Any complication	23.9% (28)	21.7% (34)	0.46