

The AO Pediatric Comprehensive Classification of Long-Bone Fractures (PCCF) was developed by Dr Teddy Slongo and Dr Laurent Audigé and is considered in detail in this section.

Diagnosis						
Location				Morphology		
Bone	Segment	Bone in paired bones	Sub-segment	Pattern	Severity	Displacement
1	1	ru	E	1 - 9	.1 .2	Dist. humerus I-V Prox. radius I-III Prox. femur I-III
2	2	tf	M			
3	3		D		Site of avulsion	
4					m l	



The fracture location comprises:

- The different long bones
- The respective segments
- The subsegments

Diagnosis						
Location				Morphology		
Bone	Segment	Bone in paired bones	Sub-segment	Pattern	Severity	Displacement
1	1	ru	E	1 - 9	.1 .2	Dist. humerus I-V Prox. radius I-III Prox. femur I-III
2	2	tf	M			
3	3		D		Site of avulsion	
4						



The morphology of the fracture is documented by a specific child code that stands for the:

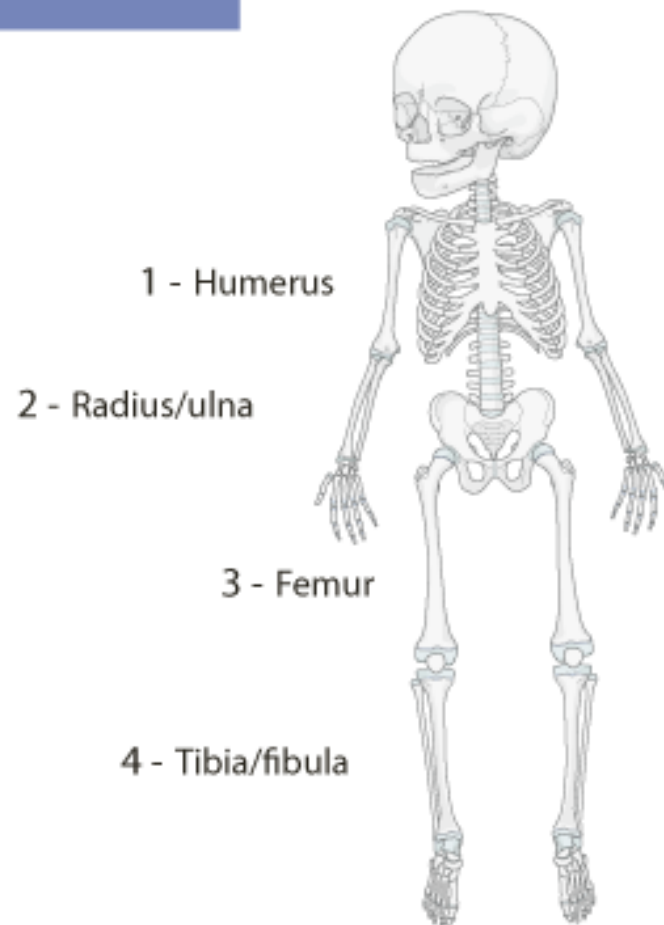
- Fracture pattern
- Severity code
- Additional code (used in certain types of displaced distal humeral, displaced proximal radial and femoral neck fractures)

Location

Location

Bone

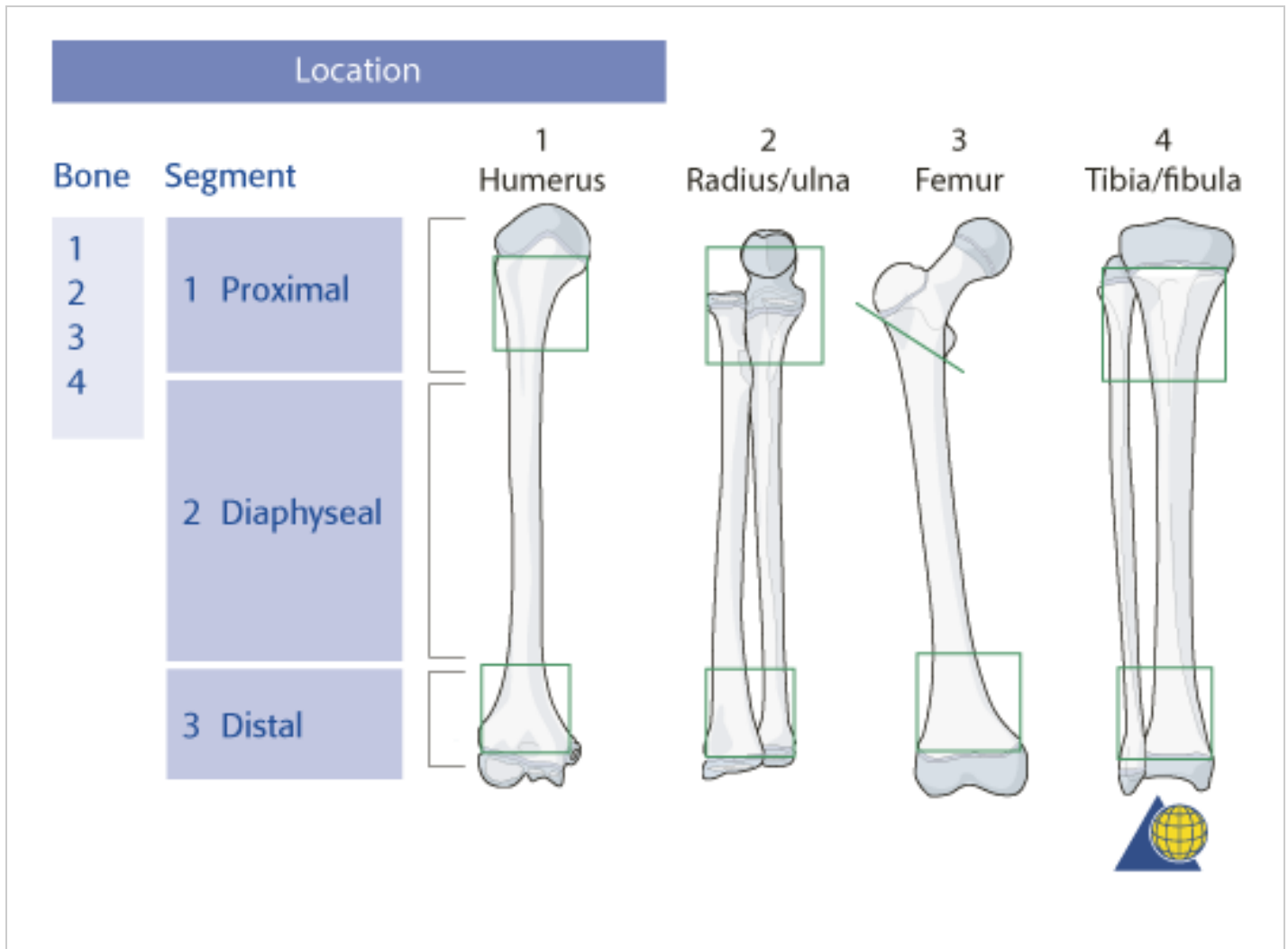
1
2
3
4



Bone

The long bones are numbered:

1. Humerus
2. Radius/ulna
3. Femur
4. Tibia/fibula



Segment

Within each of the four long bones, there are three segments:

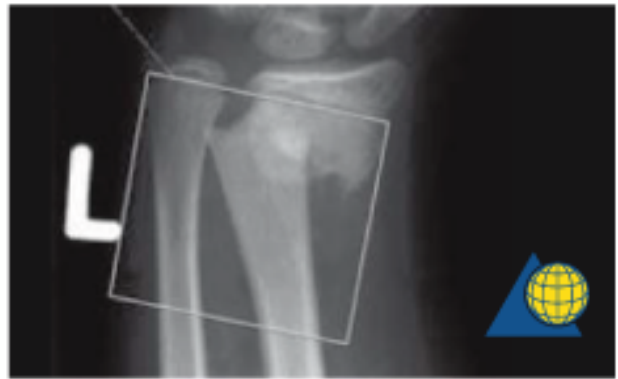
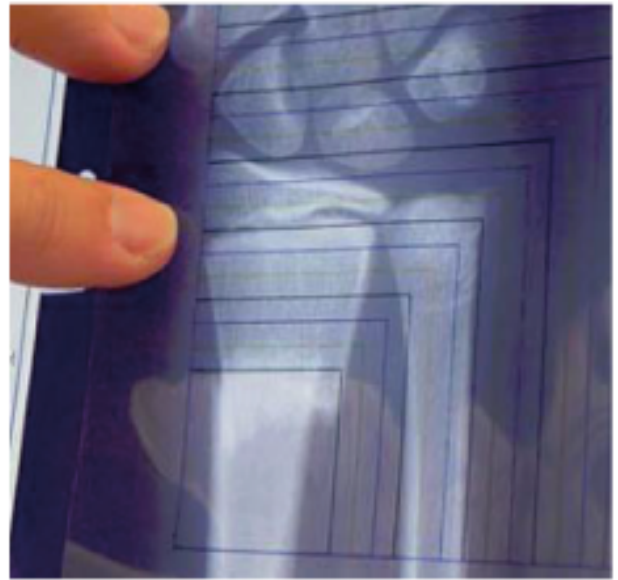
1. Proximal
2. Diaphyseal
3. Distal

Location

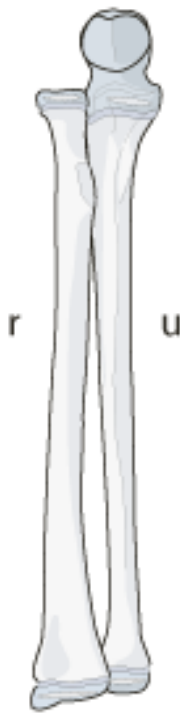
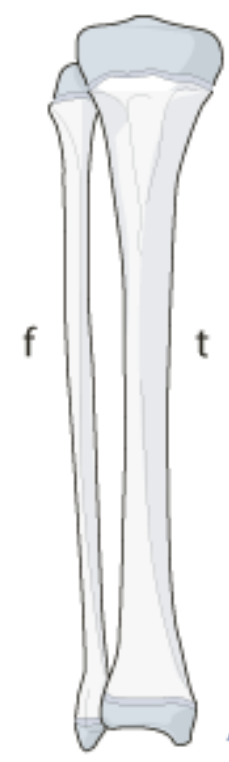
Bone Segment

1
2
3
4

1
2
3



The proximal or distal segment comprises that area of bone covered by a square, the sides of which are equal to the maximal width of the bone at the physal level.

Location			Radius/ulna	Tibia/fibula
Bone	Segment	Bone in paired bones		
1	1	ru		
2	2	tf		
3	3			
4	3			

Paired bones

When, in paired bones, (radius/ulna or tibia/fibula) both bones are fractured with the same fracture pattern (see child code), these two fractures should be documented by only one classification code.

In such a case, the severity code will be that of the bone that is more severely fractured.

Location

Bone	Segment	Bone in paired bones
------	---------	----------------------

1	1	ru
2	2	tf
3	3	
4		



22u



When, in paired bones, only one bone is fractured, a small letter designates this bone (ie, "r", "u", "t", or "f") and should be added to the segment code.

Example: 22u describes an isolated diaphyseal fracture of the ulna.

Location		
Bone	Segment	Bone in paired bones
1	1	ru
2	2	tf
3	3	
4		

When, in paired bones, both bones are fractured with different fracture patterns, each fracture must be coded separately.

Example: A complete, spiral fracture of the radius and a bowing fracture of the ulna are coded as 22r-D/5.1 and 22u-D/1.1

Location			
Bone	Segment	Bone in paired bones	Sub-segment
1	1	ru	E
2	2	tf	M
3	3		D
4			

The diagram shows a long bone with three main regions highlighted by green boxes. The top region is labeled 'E - Epiphysis' and 'M - Metaphysis'. The middle region is labeled 'D - Diaphysis'. The bottom region is labeled 'E - Epiphysis' and 'M - Metaphysis'. A small globe icon is located at the bottom right of the diagram.

Subsegment

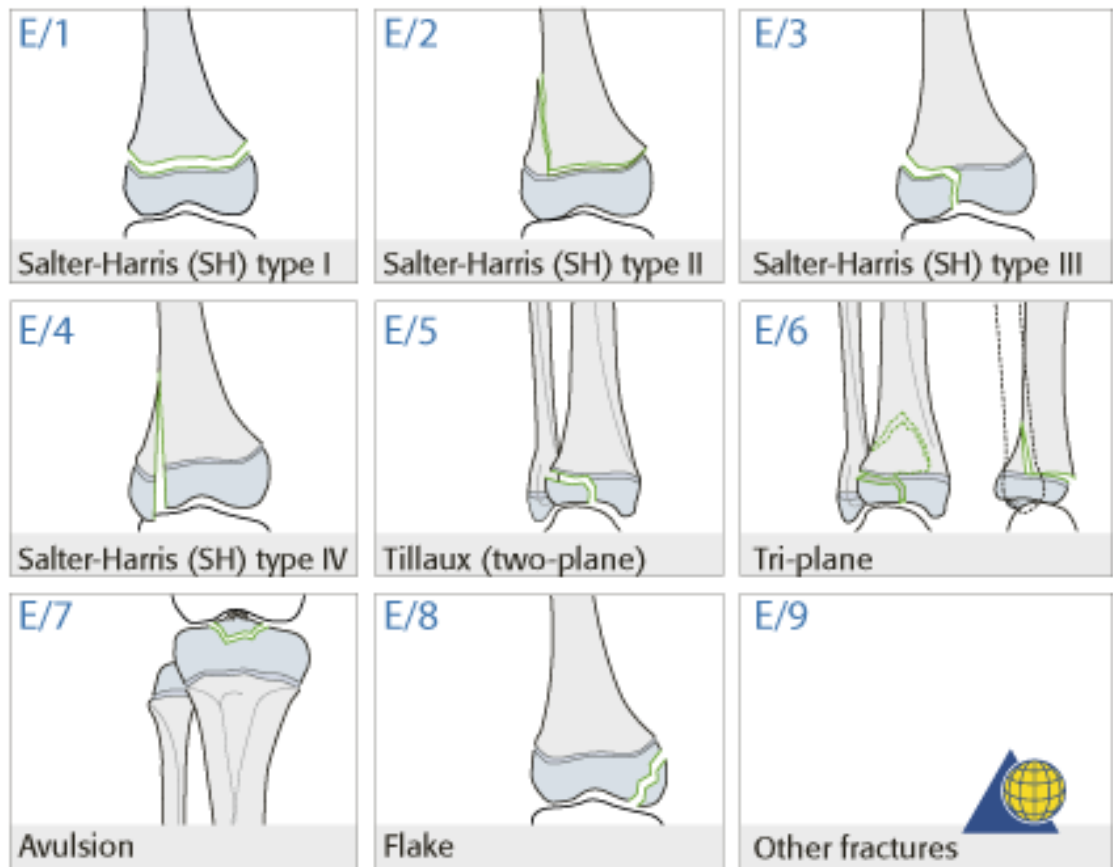
Within the segments 1- and 3- of each diaphyseal bone, the segment is subdivided into E (epiphysis) or M (metaphysis). The diaphyseal segment is coded D.

Morphology

Morphology

Pattern

1 - 9



Pattern

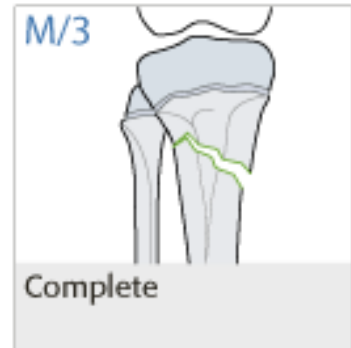
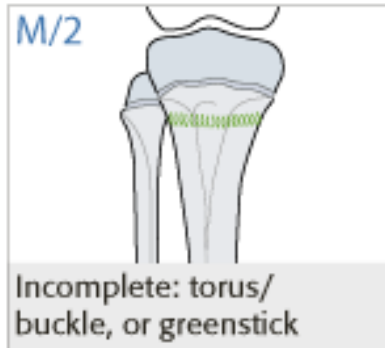
The primary, epiphyseal morphology coding is mapped to the Salter-Harris classification, with some additions as illustrated:

- Salter-Harris type I – E/1
- Salter-Harris type II – E/2
- Salter-Harris type III – E/3
- Salter-Harris type IV – E/4
- Tillaux (two plane) – E/5
- Tri-plane – E/6
- Avulsion – E/7
- Flake – E/8
- Other fractures – E/9

Morphology

Pattern

1 - 9



Metaphyseal fractures are coded, as illustrated:

- Incomplete – M/2
- Complete – M/3
- Avulsions – M/7
- Other – M/9

Morphology

Pattern

1 - 9



Bowing



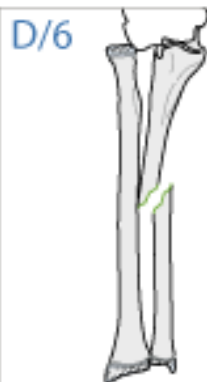
Greenstick



Complete
transverse $\leq 30^\circ$



Complete oblique
/spiral $> 30^\circ$



Monteggia



Galeazzi

D/9

Other fractures



Diaphyseal fracture patterns are coded as illustrated:

- Bowing – D/1
- Greenstick – D/2
- Complete transverse $\leq 30^\circ$ – D/4
- Complete oblique/spiral $> 30^\circ$ – D/5
- Monteggia – D/6
- Galeazzi – D/7
- Other fractures – D/9

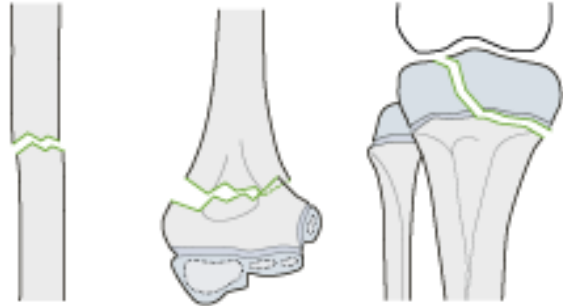
Morphology

Pattern Severity

1 - 9

.1 .2

.1 Simple



Only two main fragments

.2 Multifragmentary



Two main fragments and at least one intermediate fragment



Severity

Fracture severity is coded as simple (.1) or multifragmentary (.2).

Morphology

Pattern Severity

1 - 9

.1 .2

Site of
avulsion

m l

13-M/7m



Medial avulsion

13-E/7l



Lateral avulsion



Site of avulsion

The letters “M” and “L” stand for medial and lateral as modifiers of the M/7 and E/7 avulsion injury codes.

Displacement

Fracture displacement is codified into types, at the distal humerus and the proximal radius.

Morphology

Pattern Severity Displacement

1 - 9	.1 .2	Dist. humerus I-V Prox. radius I-III Prox. femur I-III
	Site of avulsion	
	m l	

Incomplete fractures

Type I



Type II



Distal humeral fracture displacements are coded as types I-IV, as illustrated:

- Type I - incomplete fracture where Rogers' line still intersects the capitellum AND in the AP view there is no more than 2 mm valgus/varus fracture gap
- Type II - incomplete fracture where Rogers' line does not intersect the capitellum OR in the AP view there is more than 2 mm valgus/varus fracture gap

Morphology

Pattern	Severity	Displacement
1 - 9	.1 .2	Dist. humerus I-V Prox. radius I-III Prox. femur I-III
	Site of avulsion	
	m l	

Complete fractures

Type III



Type IV



- Type III - complete fracture with no bone continuity (broken cortex), but still some contact between the fracture
- Type IV - complete fracture with no bone continuity and no contact between the fracture surfaces

Morphology

Pattern Severity Displacement

1 - 9	.1 .2	Dist. humerus I-V Prox. radius I-III Prox. femur I-III
	Site of avulsion	
	m l	

Type I



No angulation and no displacement

Type II



Angulation with displacement of up to half of the bone diameter

Type III






Angulation with displacement of more than half of the bone diameter

Radial head displacements are codified as Types I-III, as illustrated:

- Type I - no angulation and no displacement
- Type II - angulation with displacement of up to half of the bone diameter
- Type III - angulation with displacement of more than half of the bone diameter

Morphology		
Pattern	Severity	Displacement
1 - 9	.1 .2	Dist. humerus I-V Prox. radius I-III Prox. femur I-III
	Site of avulsion	
	m I	

Type I

Midcervical
Type II

Basicervical
Type III

Transtrochanteric

Other modifying codes

Proximal femoral metaphyseal fractures can be further divided into three types, which are represented by an additional code (I–III) that takes into account the position of the fracture at the proximal metaphysis:

- Midcervical (type I)
- Basicervical (type II)
- Transtrochanteric (type III)

Example: 31-M/2.1 III

Further reading

Additionally, the AO Foundation offers a software package ([AO Comprehensive Injury Automatic Classifier, AOCOIAC](#)), free of charge, which classifies both adults' and children's fractures.



AO Pediatric Comprehensive Classification of Long-Bone Fractures (PCCF)

This leaflet has been designed to provide an introduction to the classification of long-bone fractures in children.



The classification of children's fractures is covered comprehensively in the illustrated brochure, which can be accessed online as a [PDF](#) file.

Appendix

Shortcuts

[All Preparations](#)



[All Approaches](#)



[All Reductions & Fixations](#)



[Contact](#) | [Disclaimer](#) | [AO Foundation](#)