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Fracture and Dislocation Compendium—2018

A joint collaboration between the Orthopaedic Trauma Association and the AO Foundation

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Fracture and Dislocation Classification Compendium—2018

International Comprehensive Classification of Fractures and Dislocations Committee

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Foreword

Dear Colleague

We would like to introduce you to the 2018 OTA/AO (or AO/OTA) Fracture and Dislocation Classification Compendium. This is the second revision of the compendium which was first published in 1996 as a cooperative effort of the AO Foundation and the Orthopaedic Trauma Association (OTA). Both organizations were committed to assuring that there was a standardized and rational methodology of describing fractures and dislocation as well as a mechanism to code data for future recall. These principles were absolutely necessary to establish a consistent system for clinical interaction and research.

After 20 years of use, the current revision addresses the many suggestions to help improve the application of the system, correct errors, and add new classifications. The process was under the direction of a committee of four individuals representing both organizations, with experience in the day to day application of the compendium and fracture coding. The process was supervised and funded by the Classification Committee of the OTA and AOTrauma International Board (AOTIB). An ongoing agreement between both organizations to assure the ongoing collaborative support of the revision process of the compendium was also developed. Importantly, copyright will remain with both organizations so that its reproduction and promulgation will be unencumbered. This establishes not only mutual ownership but also responsibility and ensures continued collaboration and support.

We believe that this is an important step forward in the process of clinical research as well as standardizing day to day clinical communication. However, change is inevitable and both the OTA and the AOTIB encourage comment and criticisms so that the next revision process can continue to improve the compendium.

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Material presented in this Compendium is based on the Comprehensive Classification of Fractures of Long Bones by M.E. Müller, J. Nazarian, P. Koch and J. Schatzker, Springer-Verlag, Berlin, 1990. The Orthopaedic Trauma Association is indebted to Professor Maurice Müller for allowing use of the system.
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To encourage the use of this classification and this fracture classification compendium, the figures may be reproduced and the classification may be used for research, educational and or medical purposes without the need to request permission from the OTA, AO Foundation or the publisher. It cannot be used commercially or for-profit without permission.
The AO Foundation/Orthopaedic Trauma Association (AO/OTA) fracture classification was published as a compendium to the Journal of Orthopaedic Trauma (JOT) in 1996.1 Using the principles of the Comprehensive Classification of Fractures of the Long Bones (CCF) developed by Muller and collaborators, the OTA classification committee classified and coded the remaining bones.2,3 This helped bring order to the state of fracture classification with its multiple systems that had thwarted any possibility of a standardized language and accumulation of uniform data.

Since the compendium was published in 1996, the classification has resided on the OTA and AO Foundation websites and has been regularly used in trauma databases, scientific journals, and textbooks worldwide. It is the official classification of the OTA, the AO, and JOT. It has gained wide acceptance and its use has dramatically improved the way information about fractures is communicated, stored, and used to advance knowledge. In some anatomical areas, this classification has largely supplanted multiple options achieving one of the original intentions.1,2,3

The classification is intended to be a flexible evolving system in which changes are made based on user feedback, criticism, and appropriate clinical research, thus serving the needs of the orthopedic community for both clinical practice and research.

In 2007, the AO and OTA classification committees undertook a revision to address issues of reliability, reproducibility, and need. This revision was based on the premise that changes needed to be validated prior to being implemented. The validation process was expensive and not practical so a decision was made to not validate all edits. The 2007 revision standardized the two different alphanumeric codes into one agreed-upon scheme, thus developing an internationally recognized uniform system for clinical research on fractures and dislocations.

The validated AO Pediatric Classification of Fractures developed by Slongo was also included in the compendium.4,5 The two committees confirmed the original premise that the revision process needed to be undertaken every 10 years.

Ongoing concerns about terminology, the relevancy of certain classification schemes, and the need to streamline codes provided the impetus to undertake the 2018 review.6–12 To make this an effective, economical, and efficient process, the AOTrauma International Board (AOTIB) and OTA appointed five persons to form the International Comprehensive Classification of Fractures and Dislocations Committee (ICCCF). The process began with the aims to address editorial errors, criticisms of the proximal humerus and proximal femur classification, and to simplify the coding process based on fracture pattern occurrence and complexity using a modified Delphi approach. A priority for this revision was to maintain the original principles of the CCF with regard to definitions and the basic coding system. It became apparent that many of the fracture patterns occurred so infrequently that there was no need to have a unique code for them, as they could easily be coded by a shortened generic system. Frequency plots of a large registry that uses these codes confirmed this. It became evident that it would be more accurate to code radius and ulna fractures separately and to align the system with ICD-10 terminology.13 The same was done for the other two-bone system by adding a new coding system for fibula fractures. The former editions had many qualifications and sub-qualifications for each fracture pattern, many of which were duplications. The committee decided to group these into a universal modifier list that could be applied to every fracture as desired by the end user, who codes the fracture. All fracture specific modifiers were maintained with their specific fracture or dislocation. As this classification system provides standard terminology and codes, it also felt appropriate to combine, insert, or reference other commonly accepted classifications (eg, Neer) into the AO/OTA descriptions and codes. This would assure consistency and greater clinical utility in fracture and dislocation classification.
The 2018 compendium revision

The compendium is branded as the AO/OTA or OTA/AO Fracture and Dislocation Classification Compendium. In publications, it will be cited as Meinberg E, Agel J, Roberts C, et al. Fracture and Dislocation Classification Compendium—2018, Journal of Orthopaedic Trauma. Volume 32: Number 1; Supplement, January 2018.

Future publications related to the revised Compendium will be authored and referenced as determined by the International Comprehensive Classification of Fractures and Dislocations Committee (ICCCFC), irrespective of its member composition.

The mandates for the 2018 revision are the following:

a) Editorial, terminology, and typographical changes and corrections:
   i. The terms “complex” and “multifragmentary” have created confusion in their application. The term “complex” did not describe a fracture pattern consisting of many fragments while “multifragmentary” does. Multifragmentary was previously used generically to refer to diaphyseal type B and C and did not have a specific alphanumeric code so was rarely used. Consequently, the committee felt that it is more concise to have three types of diaphyseal fractures: simple, wedge, and multifragmentary. “Multifragmentary” will no longer be used as a generic term for diaphyseal types B and C. A multifragmentary diaphyseal or end segment extraarticular fracture is one with many fracture fragments and after reduction there is no contact between the main fragments. A multifragmentary complete articular fracture is one with more than two fracture fragments of the articular surface.
   ii. The diaphyseal fracture classification has been made consistent for all bones. The diaphysis is defined as that part of the bone between the two end segments and is divided into three equal parts defining the location of the diaphyseal fracture. The fracture location within the diaphysis is a qualification as follows:
      a) Proximal 1/3
      b) Middle 1/3
      c) Distal 1/3
   iii. A more precise description of the intraarticular portion of proximal tibia fractures has been recommended. A modification to the proximal tibia classification as recommended by Mauricio Kfir and Joseph Schatzker to better define the significant joint fragmentation or displacement is added as qualifications for type B and C proximal tibial intraarticular fractures.
   iv. The written description of fractures has been standardized so that each fracture is presented in a similar order highlighting the specific region or fracture morphology.
   v. To facilitate data entry and lessen the error rate in coding, the hyphen in the code has been removed.
   vi. A code for fibula fractures based on the principles of the CCF has been added.
   vii. The Neer classification has been integrated into the fracture description for proximal humeral fractures to facilitate the clinician comprehension of the terms unifocal and bifocal fractures.
   viii. The proximal femoral classification terminology has been a source of confusion as a variety of descriptive terms have been used to describe similar fractures. There has also been a problem defining fractures for group 31A2. Definitions have been added to help classify these fractures and the codes reorganized to better represent these fractures. The femoral neck fractures have been organized to better align the fracture types. By adding the Pauwels classification as a qualification for femoral neck fractures a more detailed evaluation of high-energy fractures is available.
   ix. The Young-Burgess Classification of Pelvic Ring Injuries has been integrated into the AO/OTA pelvic fracture classification.

b) Addition of recently published validated classifications:
   i. OTA Open Fracture Classification
   ii. AO/OTA Scapular Fracture Classification
   iii. Unified Classification of Periprosthetic Fractures
   iv. AOSpine Subaxial Cervical and Thoracolumbar spine injury classification
   v. AOSpine Sacral Fracture Classification

c) At the request of the AOTK Thoracic Surgery Expert Group, a preliminary classification of rib and sternal fractures has been included. Publication of this classification will allow interested groups to assess its validity and reproducibility so in the next revision, a validated modification will be available.

d) Review of the codes with regards to frequency and applicability:
   i. Many of the qualifications and subqualifications of the first two compendiums were repetitious and on a survey of users were not routinely used. To simplify the usage, the common modifiers were placed in a list called Universal Modifiers. This simplifies the presentation of the codes and allows each clinician to use these as they see fit for their circumstances.
   ii. Certain qualifications were fracture-specific and were left as qualifications within the specific fracture types and groups.
   iii. Complex injuries such as the terrible triad of the elbow and a transolecranon fracture dislocation are difficult to code related to the fact that fractures of radius and ulna were placed into one code. The committee decided to separate the radius and ulna and classify fractures in each bone. This simplifies the process and when combined with the universal modifiers makes classification of complex injuries about the elbow more consistent and accurate. It also follows the ICD-10 system where each bone is coded separately.

It was recognized by the committee that this revision must maintain the principles and definitions of the CCF and the prior two compendiums. This revision represents a streamlining of the 2007 version. The aim was to assure that the majority of fracture patterns were represented. This revision provides a more concise and clinically relevant compendium. The user will be able to choose the code that best meets their needs. It is hoped that with the recognition of other standard classifications being integrated into the codes that this compendium will be of increasing value to many other orthopedic subspecialties.
Fundamentals of fracture classification

Classification is the process by which related groups are organized based on similarities and differences.\(^5\) It provides the language necessary to convey information among individuals to ensure standardization. This classification process may be looked upon as the systematic methodology of describing a fracture or dislocation. It is critical to note that a fracture should be coded only after all the information is obtained. It must be remembered that if there is doubt, then waiting until the complete information is available is mandatory before determining the final classification.\(^23-28\) The final classification may be delayed until the operative procedure is completed and the fracture fully visualized.

This system provides the clinician with standardized definitions so the verbal fracture description is precise and consistent from bone to bone and fracture to fracture. These standard definitions and guidelines for application assure consistency in the classification process.\(^16,24-37\) With the improved consistency of fracture descriptions, future investigations assessing treatment guidelines, prognosis, and risk of complications will be more reliable and meaningful. The system also provides a mechanism to convert the verbal description into an alphanumeric code to allow for data storage and future recall. The use of this alphanumeric coding scheme is absolutely necessary for multi-center collaboration, retrospective comparison of results, international communication, and to standardize recording information about all fractures in a trauma database.

The classification offers several other benefits. It provides a hierarchy of severity as the descriptions generally proceed from simple to multifragmentary fractures. This hierarchy is based on the energy of injury or potential complexity of treatment. Ease of use is also an important aspect for a classification. This system allows the clinician to be as general or detailed as necessary according to their clinical or research needs. The classification is logical, comprehensible, and does not contain an unmanageable number of categories, a problem that ensures poor reliability.

Principles of fracture and dislocation classification

The principles of classification\(^7\) are based on understanding and applying standardized definitions. These definitions are universal and allow consistency in classification and communication. Although clinical decisions are sometimes made on incomplete information, this should be avoided as much as possible when classifying a fracture—the more precise the description the better the data recorded. Attention should be paid to upper-case versus lower-case letters and ( ) versus [ ] as this will aid in accurate fracture pattern retrieval from databases.

Fracture localization—bones and segments

The bone is identified (Fig 1).

![Fig 1 Designation of bone location.](image-url)
Next, it is necessary to determine where in the bone the fracture is located. This requires precise definitions of the parts of a bone. The proximal and distal end segments of the long bones are defined by a square whose sides are the same length as the widest part of the epiphysis/metaphysis in question (Heim’s system of squares). Each bone has a proximal and distal end segment, between which the diaphysis or shaft is located. These definitions apply to any bone with articulations at both ends and a segment of cortical bone between the articulations, for example, a femur, or a metacarpal, or a phalanx. With the two bone systems now having separate codes, it was decided to maintain the standard definition of the end segments with bones not separated (Fig 2).

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Fracture morphology: types, groups, subgroups, qualifications, and universal modifiers

The type (upper-case letter) is a general description of fracture patterns while the group (numerals) is a more specific description based on the individual bone or specific fracture pattern.

The morphology of the diaphyseal fracture is defined as:

**Simple—Type A** fractures have a single circumferential disruption of the diaphysis. An oblique fracture forms an angle ≥30° to a line perpendicular to the long axis of the bone. (Fig 3).

**Wedge—Type B** fractures are characterized by contact between the main fragments after reduction usually restoring the normal length of the bone. The wedge fragment may be intact, or in multiple fragments (ie, fragmentary wedge). The differentiation between spiral and bending wedge is inconsistent and not easily determined so these terms were moved to the universal modifiers (Fig 4).

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**Fig 2** Determine the location of the end segment.

Two exceptions are the proximal femur, defined as being above a line that passes transversely through the inferior edge of the lesser trochanter and the malleolar segment of the distal tibia. The bone segments are numbered as:

- Proximal end segment = 1
- Diaphyseal segment = 2
- Distal end segment = 3

---

**Fig 3** Simple fractures. The dot represents the center of the fracture.

The location of the fracture is determined by finding its center. This is defined as follows:

- In a simple fracture, the center of the fracture is obvious (Fig 3).
- In a wedge fracture, the center is at the level of the broadest part of the wedge (Fig 4).
- In a fragmentary wedge and a multifragmentary fracture, the center can be determined only after reduction (Fig 4).
- Any diaphyseal fracture associated with a displaced articular component is considered an articular fracture.
- If a fracture is associated with an undisplaced fissure that reaches the joint, it is classified as a metaphyseal or diaphyseal fracture depending on its center.
- If one bone has two completely separate fractures, one in the diaphysis and one in the proximal or distal end segments (eg, a femoral diaphysis and a femoral neck fracture), each fracture must be classified separately.

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**Fig 4** Wedge fractures. The dot represents the center of the fracture.
Multifragmentary—Type C fractures consist of many fracture lines and fracture fragments. These fractures were known as either wedge or complex fractures in the Müller comprehensive classification. "Complex" is a term that caused confusion because it is nonspecific and is replaced in the 2018 version by the term "multifragmentary" meaning many contiguous fracture fragments, and not a wedge fracture.

In the diaphyseal segment, the fractured segment is either intact or in many fragments so that after reduction if the fractured area were removed there would be no contact between the proximal and distal fragments. Fragmentary is used to describe fragmentation of a wedge or segment (Fig 5).

The morphology for end segment fractures is based on whether they are extraarticular (no extension into the articular surface) or intraarticular (has an extension into the articular surface).

Extraarticular—Type A: The fracture line may be metaphyseal or epiphyseal, but it always spares the articular surface although it may be intracapsular.

Partial articular—Type B: The fracture involves part of the articular surface while the remainder of the joint remains intact and is solidly connected to the supporting metaphysis and diaphysis.

Complete articular—Type C: There is a disruption of the articular surface and the articular surface is completely separated from the diaphysis.

Further description of fracture morphology at the articular surface or metaphysis use the previously defined terms of simple (single disruption of the joint surface) and multifragmentary (multiple disruptions of the joint surface) patterns. Avulsion fractures are always classified as extraarticular simple fractures (Fig 6).

Fig 5 Multifragmentary fractures.

Fig 6 End segments fractures are divided into three types.

Exceptions

The proximal end segment of the humerus and femur are exceptions:

- Simple proximal humeral fractures involving one tuberosity or the metaphysis (unifocal or Neer 2-part fractures) and proximal femoral fractures involving the trochanteric area are type A.
- The partial articular type does not exist in the humerus or femur. Proximal humeral fracture involving one tuberosity and the metaphysis (bifocal or Neer 3-part fractures), and the proximal femoral fracture involving the femoral neck are type B.
- Proximal humeral articular fractures involving the anatomical neck of the humerus and fractures involving the femoral head are type C.

The definitions or description of groups and subgroups are fracture specific.
**Universal modifiers**

The universal modifiers are descriptive terms of fracture morphology, displacement, associated injury, or location that are generalizable to most fractures. They provide detail that are optional for users.

Universal modifiers may be added to the end of the fracture code within square brackets, eg, [1].

Multiple universal modifiers may be contained within the same set of squared brackets and separated by a comma.

**Example:** A proximal humerus fracture-dislocation with displacement, anterior dislocation, cartilage injury, and osteopenia = 11A1.2[2,5a,8e,9]

**Example:** Humerus, proximal end segment, articular or 4-part fracture, with multifragmentary metaphyseal fracture and articular fracture with an anterior dislocation = 11C3.2[5a]

### List of universal modifiers

<table>
<thead>
<tr>
<th></th>
<th>Modifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nondisplaced</td>
</tr>
<tr>
<td>2</td>
<td>Displaced</td>
</tr>
<tr>
<td>3</td>
<td>Impaction</td>
</tr>
<tr>
<td>3a</td>
<td>Articular</td>
</tr>
<tr>
<td>3b</td>
<td>Metaphyseal</td>
</tr>
<tr>
<td>4</td>
<td>No impaction</td>
</tr>
<tr>
<td>5</td>
<td>Dislocation</td>
</tr>
<tr>
<td>5a</td>
<td>Anterior (volar, palmar, plantar)</td>
</tr>
<tr>
<td>5b</td>
<td>Posterior (dorsal)</td>
</tr>
<tr>
<td>5c</td>
<td>Medial (ulnar)</td>
</tr>
<tr>
<td>5d</td>
<td>Lateral (radial)</td>
</tr>
<tr>
<td>5e</td>
<td>Inferior (with hip is also obturator)</td>
</tr>
<tr>
<td>5f</td>
<td>Multidirectional</td>
</tr>
<tr>
<td>6</td>
<td>Subluxation/ligamentous instability</td>
</tr>
<tr>
<td>6a</td>
<td>Anterior (volar, palmar, plantar)</td>
</tr>
<tr>
<td>6b</td>
<td>Posterior (dorsal)</td>
</tr>
<tr>
<td>6c</td>
<td>Medial (ulnar)</td>
</tr>
<tr>
<td>6d</td>
<td>Lateral (radial)</td>
</tr>
<tr>
<td>6e</td>
<td>Inferior (with hip is also obturator)</td>
</tr>
<tr>
<td>6f</td>
<td>Multidirectional</td>
</tr>
<tr>
<td>7</td>
<td>Diaphyseal extension</td>
</tr>
<tr>
<td>8</td>
<td>Articular cartilage injury*</td>
</tr>
<tr>
<td>8a</td>
<td>ICRS Grade 0 Normal</td>
</tr>
<tr>
<td>8b</td>
<td>ICRS Grade 1 Superficial indentation (A) and/or superficial fissures and cracks (B)</td>
</tr>
<tr>
<td>8c</td>
<td>ICRS Grade 2 Abnormal lesions extending down to 50% of cartilage depth</td>
</tr>
<tr>
<td>8d</td>
<td>ICRS Grade 3 (A) Severely abnormal with defects extending down &gt;50% of cartilage depth; (B) down to calcified layer; (C) down to subchondral bone but not through; (D) blisters included</td>
</tr>
<tr>
<td>8e</td>
<td>ICRS Grade 4 Severely Abnormal Cartilage loss through subchondral bone</td>
</tr>
<tr>
<td>9</td>
<td>Poor bone quality</td>
</tr>
<tr>
<td>10</td>
<td>Replantation</td>
</tr>
<tr>
<td>11</td>
<td>Amputation associated with a fracture</td>
</tr>
<tr>
<td>12</td>
<td>Associated with a nonarthroplasty implant</td>
</tr>
<tr>
<td>13</td>
<td>Spiral type fracture</td>
</tr>
<tr>
<td>14</td>
<td>Bending type fracture</td>
</tr>
</tbody>
</table>

*This grading system is used with the permission of the International Cartilage Repair Society.*
Qualifications

The fracture qualifications are descriptive terms of fracture morphology or location that are specific to each fracture.

- All fracture classification qualifications are lower-case letters to differentiate them from the fracture type, which is always an upper-case letter.
- All fracture qualifications are inserted in place of the asterisk in the fracture code as a lower-case letter within a round bracket, eg, (a).
- Where appropriate in the classification sections, the qualification that corresponds to an image is bolded.

Example: Humerus, proximal end segment, articular or 4-part fracture, with multifragmentary metaphyseal fracture and simple articular fracture with an anterior dislocation 11C3.2(x)[5a]

The process of classification and coding a diaphyseal fracture

<table>
<thead>
<tr>
<th>Step</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What is the bone?</td>
<td>Specific bone (see Fig 1 for bone number)</td>
</tr>
<tr>
<td>2</td>
<td>Is the fracture at the end or middle segment?</td>
<td>Middle—diaphyseal segment (2)</td>
</tr>
<tr>
<td>3</td>
<td>What is the type?</td>
<td>Simple (A), wedge (B), multifragmentary (C)</td>
</tr>
<tr>
<td>4a</td>
<td>Group: If simple (A): What is the fracture pattern (group)?</td>
<td>Spiral (1), oblique (2), transverse (3)</td>
</tr>
<tr>
<td>4b</td>
<td>Group: If wedge (B): What is the fracture pattern (group)?</td>
<td>Intact (2) or fragmentary (3)</td>
</tr>
<tr>
<td>4c</td>
<td>Group: If multifragmentary (C): What is the fracture pattern (group)?</td>
<td>Intact segmental (2) or fragmentary segmental (3)</td>
</tr>
<tr>
<td>5</td>
<td>Add qualifications and/or universal modifiers</td>
<td></td>
</tr>
</tbody>
</table>

The process of classification and coding an end-segment fracture

<table>
<thead>
<tr>
<th>Step</th>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>What is the bone?</td>
<td>Specific bone (see Fig 1 for bone number)</td>
</tr>
<tr>
<td>2</td>
<td>At which end is the fracture located?</td>
<td>Proximal (1) or distal (3)</td>
</tr>
<tr>
<td>3</td>
<td>Type: Does the fracture enter the joint surface (type)?</td>
<td>No—extraarticular (A), go to 5 Yes—articular (B or C), go to 4(a,b)</td>
</tr>
<tr>
<td>4a</td>
<td>Type: If articular, is it partial (part of joint attached to metaphysis)?</td>
<td>Yes (type B), go to 6</td>
</tr>
<tr>
<td>4b</td>
<td>Type: If articular, is it complete (no part of joint attached to metaphysis)?</td>
<td>Yes (type C), go to 7</td>
</tr>
<tr>
<td>5</td>
<td>Group: If extraarticular (A) what is the fracture pattern?</td>
<td>Avulsion (1), simple (2), wedge or multifragmentary (3)</td>
</tr>
<tr>
<td>6</td>
<td>Group: If partial articular (B) what is the fracture pattern?</td>
<td>Simple (1), split and/or depression (2), fragmentary (3)</td>
</tr>
<tr>
<td>7</td>
<td>Group: If complete articular (C) what is the articular fracture pattern?</td>
<td>Simple (1), multifragmentary (2)</td>
</tr>
<tr>
<td>8</td>
<td>Subgroup: If complete articular (C) what is the metaphyseal fracture pattern?</td>
<td>Simple articular with simple metaphyseal (1), simple articular fracture with multifragmentary metaphyseal (2), multifragmentary articular with multifragmentary metaphyseal (3)</td>
</tr>
<tr>
<td>9</td>
<td>Add qualifications and/or universal modifiers</td>
<td></td>
</tr>
</tbody>
</table>
Summary

Since the original publication of the AO/OTA Fracture Classification in the 1996 Journal of Orthopaedic Trauma Compendium, there has been important progress in fracture classification toward the goal of a universally accepted comprehensive fracture language. The 21 years of use of the AO/OTA compendium has demonstrated its strengths and shortcomings. Although admirable, the process of classification validation has been time consuming and expensive and generally not practical in a retrospective manner for accepted classifications. With the increased use of validated patient outcomes, a standardized comprehensive classification of injury is necessary. The AOTIB and OTA Classification Committee through the International Comprehensive Classification of Fractures and Dislocations Committee realized the need to make the compendium as comprehensive and standardized as possible. This third compendium addresses many of the prior criticisms as well as updating the prior editions and adding new published classifications. These changes in content and presentation should make the compendium more universal and simpler to use. These standardized classification systems should make injury description more standardized and so improve research and fracture outcomes assessments.

The collaboration of the AOTIB and the OTA through their classification committees has resulted in the return of the compendium copyright to both organizations so it is available for any clinician to use without charge. This collaboration has allowed its worldwide dissemination. The organizations are committed to working together to continually evaluate the compendium and revise as necessary.

Acknowledgments

The committee would like to acknowledge and gratefully thank Jessica Schisel, Jecca Reichmuth, Marcel Erismann, and Kathleen Caswell, all the staff of the OTA office, and the AO Education Institute for their tremendous support and encouragement.

The committee would also like to acknowledge the important contributions to the prior compendiums from Larry Marsh, MD, Theddy Slongo MD, and Laurent Audige PhD.
References


Humerus

Bone: Humerus

Location: Humerus, proximal end segment

Types:
- Humerus, proximal end segment, extraarticular, unifocal, 2-part fracture 11A
- Humerus, proximal end segment, extraarticular, bifocal, 3-part fracture 11B
- Humerus, proximal end segment, articular or 4-part fracture 11C

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
11A

**Type:** Humerus, proximal end segment, *extraarticular, unifocal, 2-part fracture*  11A

**Group:** Humerus, proximal end segment, extraarticular, unifocal, 2-part, *tuberosity fracture*  11A1

**Subgroups:**
- Greater tuberosity fracture  11A1.1
- Lesser tuberosity fracture  11A1.2

**Group:** Humerus, proximal end segment, extraarticular, unifocal, 2-part, *surgical neck fracture*  11A2

**Subgroups:**
- Simple fracture  11A2.1
- Wedge fracture  11A2.2
- Multifragmentary fracture  11A2.3

**Group:** Humerus, proximal end segment, unifocal, 2-part, *extraarticular vertical fracture*  11A3
11B

Type: Humerus, proximal end segment, extraarticular, bifocal, 3-part fracture 11B

Group: Humerus, proximal end segment, extraarticular, bifocal, 3-part, surgical neck fracture 11B1

Subgroups:
- With greater tuberosity fracture 11B1.1*
- With lesser tuberosity fracture 11B1.2*

*Qualifications:
- u Intact wedge
- v Fragmentary wedge

11C

Type: Humerus, proximal end segment, articular or 4-part fracture 11C

Group: Humerus, proximal end segment, articular or 4-part, anatomical neck fracture 11C1

Subgroups:
- Valgus impacted fracture 11C1.1*
- Isolated anatomical neck fracture 11C1.3

*Qualifications:
- n Greater tuberosity
- o Lesser tuberosity
- p Both tuberosities
**Group:** Humerus, proximal end segment, articular or 4-part, *anatomical neck fracture associated with metaphyseal fracture* 11C3

**Subgroups:**

- With a multifragmentary metaphyseal segment with intact articular surface 11C3.1
- With a multifragmentary metaphyseal segment with articular fracture 11C3.2*
- With a multifragmentary metaphyseal fracture, with diaphyseal extension and articular fracture 11C3.3*

*Qualifications:

- x Simple articular
- y Multifragmentary articular
12

Location: Humerus, diaphyseal segment

Types:
- Humerus, diaphyseal segment, simple fracture 12A
- Humerus, diaphyseal segment, wedge fracture 12B
- Humerus, diaphyseal segment, multifragmentary fracture 12C

Groups:
- Humerus, diaphyseal segment, simple, spiral fracture 12A1*
- Humerus, diaphyseal segment, simple, oblique fracture (>30°) 12A2*
- Humerus, diaphyseal segment, simple, transverse fracture (<30°) 12A3*

*Qualifications:
- a Proximal 1/3
- b Middle 1/3
- c Distal 1/3
12B

Type: Humerus, diaphyseal segment, wedge fracture 12B

Groups:

- Humerus, diaphyseal segment, intact wedge fracture 12B2*
- Humerus, diaphyseal segment, fragmentary wedge fracture 12B3*

*Qualifications:
- a Proximal 1/3
- b Middle 1/3
- c Distal 1/3

12C

Type: Humerus, diaphyseal segment, multifragmentary fracture 12C

Groups:

- Humerus, diaphyseal segment, multifragmentary, intact segmental fracture 12C2*
- Humerus, diaphyseal segment, multifragmentary, fragmentary segmental fracture 12C3*

*Qualifications:
- i Proximal diaphyseal-metaphyseal
- j Pure diaphyseal
- k Distal diaphyseal-metaphyseal
13

Location: Humerus, distal end segment

Types:
- Humerus, distal end segment, *extraarticular fracture* 13A
- Humerus, distal end segment, *partial articular fracture* 13B
- Humerus, distal end segment, *complete articular fracture* 13C
13A

Type: Humerus, distal end segment, extraarticular fracture 13A

Group: Humerus, distal end segment, extraarticular, avulsion fracture 13A1

Subgroups:
- Lateral epicondyle fracture 13A1.1
- Medial epicondyle fracture 13A1.2

Group: Humerus, distal end segment, extraarticular, simple fracture 13A2

Subgroups:
- Spiral fracture 13A2.1
- Oblique fracture 13A2.2
- Transverse fracture 13A2.3

Group: Humerus, distal end segment, extraarticular, wedge or multifragmentary fracture 13A3

Subgroups:
- Intact wedge fracture 13A3.1*
- Fragmentary wedge fracture 13A3.2*
- Multifragmentary fracture 13A3.3

*Qualifications:
- f Lateral
- h Medial
13B

Type: Humerus, distal end segment, partial articular fracture

Group: Humerus, distal end segment, partial articular, lateral sagittal fracture

Subgroups:
- Simple transtrochlear fracture
  13B1.1
- Capitellum fracture
  13B1.2*
- Fragmentary transtrochlear fracture
  13B1.3

*Qualifications:
- q Transcapitellar
- r Between capitellum and trochlea

Group: Humerus, distal end segment, partial articular, medial sagittal fracture

Subgroups:
- Simple transtrochlear fracture through the trochlear groove
  13B2.1
- Simple transtrochlear fracture through the medial articular surface
  13B2.2
- Fragmentary transtrochlear fracture
  13B2.3

Group: Humerus, distal end segment, partial articular, frontal/coronal plane fracture

Subgroups:
- Capitellum fracture
  13B3.1
- Trochlea fracture
  13B3.2
- Capitellum and trochlea fracture
  13B3.3
13C

**Type:** Humerus, distal end segment, complete articular fracture 13C

**Group:** Humerus, distal end segment, complete, simple articular, simple metaphyseal fracture 13C1

**Subgroups:**

- **Above the transcondylar axis**
  - 13C1.1

- **Through or below the transcondylar axis**
  - 13C1.3

**Group:** Humerus, distal end segment, complete, simple articular, wedge or multifragmentary metaphyseal fracture 13C2

**Subgroups:**

- **Intact wedge fracture**
  - 13C2.1*

- **Fragmentary wedge fracture**
  - 13C2.2*

- **Multifragmentary fracture**
  - 13C2.3

**Group:** Humerus, distal end segment, complete, multifragmentary articular fracture, wedge or multifragmentary metaphyseal fracture 13C3

**Subgroups:**

- **Simple metaphyseal fracture**
  - 13C3.1*

- **Wedge metaphyseal fracture**
  - 13C3.2*

- **Multifragmentary metaphyseal fracture**
  - 13C3.3

**Qualifications:**

- f Lateral
- h Medial
- u Intact wedge

**Qualifications** are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Radius and Ulna

Bone: Radius 2R/Ulna 2U

**2R1/2U1**

**Location:** Radius or Ulna, proximal end segment 2R1/2U1

→ To facilitate the coding of radius and ulna fractures, they are now coded independently.

→ The end segment location of either bone is determined by using the two bones as a unit.

**Types:**
- Radius, proximal end segment, extraarticular fracture 2R1A
- Radius, proximal end segment, partial articular fracture 2R1B
- Radius, proximal end segment, complete articular fracture 2R1C
- Ulna, proximal end segment, extraarticular fracture 2U1A
- Ulna, proximal end segment, partial articular fracture 2U1B
- Ulna, proximal end segment, complete articular fracture 2U1C

**Qualifications** are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.

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**2R1A/2U1A**

**Type:** Radius, proximal end segment, *extraarticular fracture* 2R1A

**Groups:**
- Radius, proximal end segment, extraarticular, *avulsion of bicipital tuberosity* 2R1A1
- Radius, proximal end segment, extraarticular, *neck, simple* 2R1A2
- Radius, proximal end segment, extraarticular, *neck, multifragmentary* 2R1A3

**Type:** Ulna, proximal end segment, *extraarticular fracture* 2U1A

**Groups:**
- Ulna, proximal end segment, extraarticular, *avulsion of triceps insertion* 2U1A1
- Ulna, proximal end segment, extraarticular, *metaphyseal simple fracture* 2U1A2
- Ulna, proximal end segment, extraarticular, *metaphyseal multifragmentary fracture* 2U1A3

**2R1B/2U1B**

**Type:** Radius, proximal end segment articular, *partial articular fracture* 2R1B

**Groups:**
- Radius, proximal end segment articular, partial articular, *simple fracture* 2R1B1
- Radius, proximal end segment articular, partial articular, *fragmentary fracture* 2R1B3
Type: Ulna, proximal end segment, partial articular fracture 2U1B

Groups:
- Ulna, proximal end segment, partial articular, olecranon fracture 2U1B1*
- Ulna, proximal end segment, partial articular, coronoid fracture 2U1B2*

*Qualifications:
- d Simple
- e Multifragmentary

2R1C/2U1C

Type: Radius, proximal end segment articular, complete articular fracture 2R1C*

Groups:
- Radius, proximal end segment articular, complete articular, simple fracture 2R1C1
- Radius, proximal end segment articular, complete articular, multifragmentary fracture 2R1C3

Type: Ulna, proximal end segment, complete articular fracture 2U1C

Groups:
- Ulna, proximal end segment, complete articular, olecranon and coronoid fracture 2U1C3*

*Qualifications:
- d Simple
- r Multifragmentary olecranon
- s Multifragmentary involving coronoid process
**2R2/2U2**

**Location:** Radius or ulna, diaphyseal segment 2R2/2U2

**Types:**
- Radius, diaphyseal segment, simple fracture 2R2A
- Radius, diaphyseal segment, wedge fracture 2R2B
- Radius, diaphyseal segment, multifragmentary fracture 2R2C
- Ulna, diaphyseal segment, simple fracture 2U2A
- Ulna, diaphyseal segment, wedge fracture 2U2B
- Ulna, diaphyseal segment, multifragmentary fracture 2U2C
**2R2A/2U2A**

**Type:** Radius or ulna, diaphyseal segment, **simple fracture** 2R2A/2U2A

**Groups:**
- Radius, diaphyseal segment, simple, **spiral fracture** 2R2A1*
- Radius, diaphyseal segment, simple, **oblique fracture (≥30°)** 2R2A2*
- Radius, diaphyseal segment, simple, **transverse fracture (<30°)** 2R2A3*
- Ulna, diaphyseal segment, simple, **spiral fracture** 2U2A1*
- Ulna, diaphyseal segment, simple, **oblique fracture (≥30°)** 2U2A2*
- Ulna, diaphyseal segment, simple, **transverse fracture (<30°)** 2U2A3*

*Qualifications for radius and ulna:
- a) Proximal 1/3
- b) Middle 1/3
- c) Distal 1/3
2R2B/ 2U2B

**Type:** Radius or ulna, diaphyseal segment, *wedge fracture* 2R2B/2U2B

**Groups:**

- **Radius, diaphyseal segment, intact wedge fracture**
  - 2R2B2*

- **Radius, diaphyseal segment, fragmentary wedge fracture**
  - 2R2B3*

- **Ulna, diaphyseal segment, intact wedge fracture**
  - 2U2B2*

- **Ulna, diaphyseal segment, fragmentary wedge fracture**
  - 2U2B3*

*Qualifications for radius and ulna:
  a. Proximal 1/3
  b. Middle 1/3
  c. Distal 1/3
**Type:** Radius or ulna, diaphyseal segment, *multifragmentary fracture* 2R2C/2U2C

**Groups:**

Radius, diaphyseal segment, multifragmentary, *intact segmental fracture* 2R2C2*

Radius, diaphyseal segment, multifragmentary, *fragmentary segmental fracture* 2R2C3*

Ulna, diaphyseal segment, multifragmentary, *intact segmental fracture* 2U2C2*

Ulna, diaphyseal segment, multifragmentary, *fragmentary segmental fracture* 2U2C3*

→ **Galeazzi** and **Monteggia** fracture patterns can be coded as follows:

The code for the fracture pattern is the radius or ulna fracture code with qualifier of (g) for Galeazzi or (m) for Monteggia representing disruption of the radio-ulnar joint. For more information about Galeazzi and Monteggia fractures, please refer to the Appendix.
2R3/2U3

Location: Radius/Ulna, distal end segment 2R3/2U3

Types:

Radius, distal end segment, extraarticular fracture 2R3A
Radius, distal end segment, partial articular fracture 2R3B
Radius, distal end segment, complete articular fracture 2R3C

Ulna, distal end segment, extraarticular fracture 2U3A
Ulna, distal end segment, partial articular fracture 2U3B
Ulna, distal end segment, complete articular fracture 2U3C
2R3A

**Type:** Radius, distal end segment, *extraarticular fracture* 2R3A

**Group:**
Radius, distal end segment, extraarticular, *radial styloid avulsion fracture*
2R3A1

**Subgroups:**
- Transverse, no displacement/tilt (may be shortened) 2R3A2.1
- Dorsal displacement/tilt (Colles) 2R3A2.2
- Volar displacement/tilt (Smith’s) 2R3A2.3

**Group:** Radius, distal end segment, extraarticular, *simple fracture* 2R3A2

**Subgroups:**
- Intact wedge fracture 2R3A3.1
- Fragmentary wedge fracture 2R3A3.2
- Multifragmentary fracture 2R3A3.3
2U3A

**Type:** Ulna, distal end segment, *extraarticular fracture*  2U3A

**Group:** Ulna, distal end segment, *extraarticular, styloid process fracture*  2U3A1

**Subgroups:**
- **Tip of styloid fracture**  2U3A1.1
- **Base of styloid fracture**  2U3A1.2

**Group:** Ulna, distal end segment, *extraarticular, simple fracture*  2U3A2

**Subgroups:**
- **Spiral fracture**  2U3A2.1
- **Oblique fracture (≥30°)**  2U3A2.2
- **Transverse fracture (<30°)**  2U3A2.3

**Group:** Ulna, distal end segment, *extraarticular, multifragmentary fracture*  2U3A3
2R3B

**Type:** Radius, distal end segment, partial articular fracture  2R3B

**Group:** Radius, distal end segment, partial articular, sagittal fracture  2R3B1

**Subgroups:**
- Involving scaphoid fossa  2R3B1.1
- Involving lunate fossa  2R3B1.3

**Group:** Radius, distal end segment, partial articular, dorsal rim (Barton’s) fracture  2R3B2

**Subgroups:**
- Simple fracture  2R3B2.1
- Fragmentary fracture  2R3B2.2
- With dorsal dislocation  2R3B2.3

**Group:** Radius, distal end segment, partial articular, volar rim (reverse Barton’s, Goyrand-Smith’s II) fracture  2R3B3

**Subgroups:**
- Simple fracture  2R3B3.1
- Fragmentary fracture  2R3B3.3
2R3C

**Type:** Radius, distal end segment, complete articular fracture  2R3C

**Group:** Radius, distal end segment, complete, simple articular and metaphyseal fracture  2R3C1

**Subgroups:**
- Dorsomedial articular fracture  2R3C1.1*
- Sagittal articular fracture  2R3C1.2*
- Frontal/coronal articular fracture  2R3C1.3*

**Subgroups:**
- Extending into the diaphysis  2R3C1.3*

*Qualifications:*
- t DRUJ stable
- u DRUJ unstable

**Group:** Radius, distal end segment, complete, simple articular, metaphyseal multifragmentary fracture  2R3C2

**Subgroups:**
- Sagittal articular fracture  2R3C2.1*
- Frontal/coronal fracture  2R3C2.2*
- Extending into the diaphysis  2R3C2.3*

*Qualifications:*
- t DRUJ stable
- u DRUJ unstable

**Group:** Radius, distal end segment, complete, articular multifragmentary fracture, simple or multifragmentary metaphyseal fracture  2R3C3

**Subgroups:**
- Simple metaphyseal fracture  2R3C3.1*
- Metaphyseal multifragmentary fracture  2R3C3.2*
- Extending into the diaphysis  2R3C3.3*

*Qualifications:*
- t DRUJ stable
- u DRUJ unstable

**Qualifications** are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
**Femur**

**Bone:** Femur

**Location:** Femur, proximal end segment

**Types:**

- Femur, trochanteric region fracture
- Femur, neck fracture
- Femur, head fracture

**Qualifications** are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
**31A**

**Type:** Femur, proximal end segment, trochanteric region fracture 31A

**Group:** Femur, proximal end segment, trochanteric region, simple pertrochanteric fracture 31A1

**Subgroups:**

- **Isolated single trochanter fracture**
  
  31A1.1*

- **Two-part fracture**
  
  31A1.2

- **Lateral wall intact (>20.5 mm) fracture**
  
  31A1.3

*Qualifications:
- n Greater trochanter
- o Lesser trochanter

**Group:** Femur, proximal end segment, trochanteric region, multifragmentary pertrochanteric, lateral wall incompetent ($\leq$ 20.5 mm) fracture 31A2

**Subgroups:**

- With 1 intermediate fragment
  
  31A2.2

- With 2 or more intermediate fragments
  
  31A2.3

→ For more information about calculating the lateral wall thickness, please refer to the Appendix.

**Group:** Femur, proximal end segment, trochanteric region, intertrochanteric (reverse obliquity) fracture 31A3

**Subgroups:**

- Simple oblique fracture
  
  31A3.1

- Simple transverse fracture
  
  31A3.2

- Wedge or multifragmentary fracture
  
  31A3.3
31B

Type: Femur, proximal end segment, femoral neck fracture 31B

Group: Femur, proximal end segment, femoral neck, subcapital fracture 31B1

Subgroups:
Valgus impacted fracture 31B1.1

Nondisplaced fracture 31B1.2

Displaced fracture 31B1.3

Group: Femur, proximal end segment, femoral neck, transcervical fracture 31B2

Subgroups:
Simple fracture 31B2.1*

Multifragmentary fracture 31B2.2*

Shear fracture 31B2.3*

*Qualifications:
p Pauwels 1 (<30°)
q Pauwels 2 (30–70°)
r Pauwels 3 (>70°)

Group: Femur, proximal end segment, femoral neck, basicervical fracture 31B3
31C

Type: Femur, proximal end segment, femoral head fracture 31C

Group: Femur, proximal end segment, femoral head, split fracture 31C1

Subgroups:
Avulsion of ligamentum teres fracture 31C1.1
Split, infrafoveal fracture 31C1.2
Split, suprafoveal fracture 31C1.3

Group: Femur, proximal end segment, femoral head, depression fracture 31C2

Subgroups:
Chondral lesion 31C2.1
Depression impaction fracture 31C2.2
Split depression fracture 31C2.3

→ Associated dislocations are coded using the dislocation direction universal modifier in square brackets [5_].
**32**

**Location:** Femur, diaphyseal segment

Types:
- Femur, diaphyseal segment, *simple fracture* 32A
- Femur, diaphyseal segment, *wedge fracture* 32B
- Femur, diaphyseal segment, *multifragmentary fracture* 32C
32A

Type: Femur, diaphyseal segment simple fracture 32A

Groups:
- Femur, diaphyseal segment, simple, spiral fracture 32A1*
- Femur, diaphyseal segment, simple, oblique fracture ($\geq 30^\circ$) 32A2*
- Femur, diaphyseal segment, simple, transverse fracture ($<30^\circ$) 32A3*

32B

Type: Femur, diaphyseal segment, wedge fracture 32B

Groups:
- Femur, diaphyseal segment, intact wedge fracture 32B2*
- Femur, diaphyseal segment, fragmentary wedge fracture 32B3*

*Qualifications:
- a Proximal 1/3
- b Middle 1/3
- c Distal 1/3
**32C**

**Type:** Femur, diaphyseal segment, multifragmentary fracture 32C

**Groups:**

- Femur, diaphyseal segment, multifragmentary, intact segmental fracture 32C2*
- Femur, diaphyseal segment, multifragmentary, fragmentary segmental fracture 32C3*

*Qualifications:
- i Proximal diaphyseal-metaphyseal
- j Pure diaphyseal
- k Distal diaphyseal-metaphyseal
Femur, distal end segment 33

Types:
- Femur, distal end segment, extraarticular fracture 33A
- Femur, distal end segment, partial articular fracture 33B
- Femur, distal end segment, complete articular fracture 33C

33A

Type: Femur, distal end segment, extraarticular fracture 33A

Group: Femur, distal end segment, extraarticular, avulsion fracture 33A1

Subgroups:
- Lateral epicondyle fracture 33A1.1
- Medial epicondyle fracture 33A1.2

Group: Femur, distal end segment, extraarticular, simple fracture 33A2

Subgroups:
- Spiral fracture 33A2.1
- Oblique fracture 33A2.2
- Transverse fracture 33A2.3
Group: Femur, distal end segment, extraarticular, wedge or multifragmentary fracture 33A3

Subgroups:
- Intact wedge fracture
  - 33A3.1*
- Fragmentary wedge fracture
  - 33A3.2*
- Multifragmentary fracture
  - 33A3.3

*Qualifications:
- f Lateral
- h Medial

33B

Type: Femur, distal end segment, partial articular fracture 33B

Group: Femur, distal end segment, partial articular, lateral condyle, sagittal fracture 33B1

Subgroups:
- Simple through the notch
  - 33B1.1
- Simple through the load bearing surface
  - 33B1.2
- Fragmentary fracture
  - 33B1.3

Group: Femur, distal end segment, partial articular, medial condyle, sagittal fracture 33B2

Subgroups:
- Simple through the notch
  - 33B2.1
- Simple through the load bearing surface
  - 33B2.2
- Fragmentary fracture
  - 33B2.3
Group: Femur, distal end segment, partial articular, frontal/coronal fracture 33B3

Subgroups:
- Anterior and lateral flake fracture 33B3.1
- Posterior unicondylar fracture (Hoffa) 33B3.2*
- Posterior bicondylar fracture (bilateral Hoffa) 33B3.3

*Qualifications:
- f Lateral
- h Medial

33C

Type: Femur, distal end segment, complete articular fracture 33C

Group: Femur, distal end segment, complete, simple articular, simple metaphyseal fracture 33C1

Subgroups:
- Above transcondylar axis 33C1.1
- Through or below transcondylar axis 33C1.3

Group: Femur, distal end segment, complete, simple articular, wedge or multifragmentary metaphyseal fracture 33C2

Subgroups:
- Intact wedge metaphyseal fracture 33C2.1*
- Fragmentary wedge metaphyseal fracture 33C2.2*
- Multifragmentary metaphyseal fracture 33C2.3

*Qualifications:
- f Lateral
- h Medial
**Group:** Femur, distal end segment, complete, multifragmentary articular fracture, simple, wedge or multifragmentary metaphyseal fracture 33C3

**Subgroups:**

- Simple metaphyseal fracture 33C3.1
- Wedge metaphyseal fracture 33C3.2*
- Multifragmentary metaphyseal fracture 33C3.3

*Qualifications: f Lateral h Medial s Intact l Fragmentary

**Qualifications** are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
**Patella**

**Bone:** Patella 34

**Types:**
- Patella, extraarticular fracture 34A
- Patella, partial articular sagittal fracture 34B
- Patella, complete articular fracture, frontal/coronal plane 34C

34A

**Type:** Patella, extraarticular fracture 34A

**Group:** Patella, extraarticular, avulsion fracture 34A1*

*Qualifications:*
- Proximal pole
- Distal pole
- Lateral side
- Medial side

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
**34B**

Type: Patella, partial articular, sagittal fracture 34B

Group: Patella, partial articular, sagittal, lateral fracture 34B1

Subgroup:
- Simple fracture 34B1.1
- Fragmentary fracture 34B1.2

Group: Patella, partial articular, sagittal, medial fracture 34B2

Subgroup:
- Simple fracture 34B2.1
- Fragmentary fracture 34B2.2

**34C**

Type: Patella, complete articular, frontal/coronal fracture 34C

Group: Patella, complete articular, frontal/coronal, simple fracture 34C1

Subgroup:
- Middle third fracture 34C1.1
- Proximal third fracture 34C1.2
- Distal third fracture 34C1.3
**Group:**
Patella, complete articular, frontal/coronal, *wedge fracture* 34C2

**Group:**
Patella, complete articular, frontal/coronal, *multifragmentary fracture* 34C3

*Qualifications* are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Tibia

Bone: Tibia

Location: Proximal end segment

Types:
- Tibia, proximal end segment, extraarticular fracture
  41A
- Tibia, proximal end segment, partial articular fracture
  41B
- Tibia, proximal end segment, complete articular fracture
  41C

→ To facilitate the coding of tibia and fibula fractures, they are now coded independently. The use of an "F" is required to designate the fibula.

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
41A

Type: Tibia, proximal end segment, extraarticular fracture  41A

Group: Tibia, proximal end segment, extraarticular, avulsion fracture  41A1

Subgroups:
- Of the capsular attachments  41A1.1*
- Of the tibial tubercle  41A1.2
- Of tibial spine (cruciate attachment)  41A1.3*

*Qualifications:
- Lateral (Segond) n
- Medial h

Group: Tibia, proximal end segment, extraarticular, simple fracture  41A2

Subgroups:
- Spiral fracture  41A2.1
- Oblique fracture  41A2.2
- Transverse fracture  41A2.3

Group: Tibia, proximal end segment, extraarticular, wedge or multifragmentary fracture  41A3

Subgroups:
- Intact wedge fracture  41A3.1*
- Fragmentary wedge fracture  41A3.2*
- Multifragmentary fracture  41A3.3

*Qualifications:
- Lateral f
- Medial h


41B

**Type:** Tibia, proximal end segment, partial articular fracture 41B

**Group:** Tibia, proximal end segment, partial articular, **split fracture** 41B1

**Subgroups:**
- **Lateral plateau fracture** 41B1.1
- **Medial plateau fracture** 41B1.2
- **Oblique, involving the tibial spines and 1 of the tibial plateaus** 41B1.3

**Qualifications:**
- **Lateral (L)**
- **Medial (M)**

→ For more information about the division of the proximal tibia into quadrants, please refer to the Appendix.

**Group:** Tibia, proximal end segment, partial articular, **depression fracture** 41B2

**Subgroups:**
- **Lateral plateau fracture** 41B2.1
- **Medial plateau fracture** 41B2.2

**Qualifications:**
- **Anterolateral (AL)**
- **Posterolateral (PL)**
- **Central (C)**

→ For more information about the division of the proximal tibia into quadrants, please refer to the Appendix.

**Group:** Tibia, proximal end segment, partial articular, **split-depression fracture** 41B3

**Subgroups:**
- **Lateral plateau fracture** 41B3.1
- **Medial plateau fracture** 41B3.2
- **Involving the tibial spines and 1 of the tibial plateaus** 41B3.3

**Qualifications:**
- **Anterolateral (AL)**
- **Posterolateral (PL)**
- **Central (C)**

→ For more information about the division of the proximal tibia into quadrants, please refer to the Appendix.
41C

Type: Tibia, proximal end segment, complete articular fracture 41C

Group: Tibia, proximal end segment, complete, simple articular, simple metaphyseal fracture 41C1

Subgroups:
- Without intercondylar eminence fracture 41C1.1
- With intercondylar eminence fracture 41C1.2

Group: Tibia, proximal end segment, complete, simple articular, wedge or multifragmentary metaphyseal fracture 41C2

Subgroups:
- Intact wedge fracture 41C2.1*
- Fragmentary wedge fracture 41C2.2*
- Multifragmentary metaphyseal fracture 41C2.3

Group: Tibia, proximal end segment, complete, fragmentary or multifragmentary metaphyseal fracture 41C3

Subgroups:
- Fragmentary lateral plateau fracture 41C3.1*
- Fragmentary medial plateau fracture 41C3.2*
- Multifragmentary medial and lateral plateau fracture 41C3.3*

*Qualifications:
- d Simple metaphysis
- e Multifragmentary metaphysis
- s Metadiaphyseal extension
- t Anterolateral (AL)
- u Posterolateral (PL)
- v Anteromedial (AM)
- w Posteromedial (PM)
- x Central
**42**

**Location:** Tibia, diaphyseal segment

**Types:**

- **Simple fracture**
- **Wedge fracture**
- **Multifragrumentary fracture**

---

**Proximal 1/3**

**Middle 1/3**

**Distal 1/3**
42A
Type: Tibia, diaphyseal segment, simple fracture 42A

Groups:
- Tibia, diaphyseal segment, simple, spiral fracture 42A1*
- Tibia, diaphyseal segment, simple, oblique fracture (≥ 30°) 42A2*
- Tibia, diaphyseal segment, simple, transverse fracture (<30°) 42A3*

*Qualifications:
- a Proximal 1/3
- b Middle 1/3
- c Distal 1/3

42B
Type: Tibia, diaphyseal segment, wedge fracture 42B

Groups:
- Tibia, diaphyseal segment, intact wedge fracture 42B2*
- Tibia, diaphyseal segment, fragmentary wedge fracture 42B3*

*Qualifications:
- a Proximal 1/3
- b Middle 1/3
- c Distal 1/3

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Tibia

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42C

Type: Tibia, diaphyseal segment, multifragmentary fracture 42C

Groups:

- Tibia, diaphyseal segment, multifragmentary, intact segmental fracture 42C2
- Tibia, diaphyseal segment, multifragmentary, fragmentary segmental fracture 42C3*

*Qualifications:

i) Proximal diaphyseal-metaphyseal
j) Pure diaphyseal
k) Distal diaphyseal-metaphyseal
43

**Location:** Tibia, distal end segment

**Types:**
- **43A**
  - Tibia, distal end segment, extraarticular fracture
- **43B**
  - Tibia, distal end segment, partial articular fracture
- **43C**
  - Tibia, distal end segment, complete articular fracture

**43A**

**Type:** Tibia, distal end segment, extraarticular fracture

**Group:** Tibia, distal end segment, extraarticular, simple fracture

**Subgroups:**
- **Spiral fracture**
  - 43A1.1
- **Oblique fracture**
  - 43A1.2
- **Transverse fracture**
  - 43A1.3
**Group:** Tibia, distal end segment, extraarticular, **wedge fracture** 43A2

**Subgroups:**
- Posterolateral impaction fracture 43A2.1
- Anteromedial wedge fracture 43A2.2
- Fracture extending into diaphysis 43A2.3

**Group:** Tibia, distal end segment, extraarticular, **multifragmentary fracture** 43A3

**Subgroups:**
- With 3 intermediate fragments 43A3.1
- With more than 3 intermediate fragments 43A3.2
- Extending into diaphysis 43A3.3

**43B**

**Type:** Tibia, distal end segment, **partial articular fracture** 43B

**Group:** Tibia, distal end segment, partial articular, **split fracture** 43B1

**Subgroups:**
- Frontal/coronal fracture 43B1.1*
- Sagittal fracture 43B1.2*
- Fragmentary metaphyseal fracture 43B1.3

*Qualifications:
- $\alpha$ Anterior
- $\gamma$ Posterior Volkmann

*Qualifications:
- $\beta$ Lateral
- $\zeta$ Medial articular surface including medial malleolus
Group: Tibia, distal end segment partial articular, split depression fracture 43B2

Subgroups:
- Frontal/coronal fracture 43B2.1*
- Sagittal fracture 43B2.2*
- Central fragment fracture 43B2.3

*Qualifications:
- Anterior
- Posterior Volkmann
- Lateral
- Medial

Group: Tibia, distal end segment partial articular, depression fracture 43B3

Subgroups:
- Frontal/coronal fracture 43B3.1*
- Sagittal fracture 43B3.2*
- Fragmentary metaphyseal fracture 43B3.3

*Qualifications:
- Anterior
- Posterior Volkmann
- Lateral
- Medial

43C
Type: Tibia, distal end segment, complete articular fracture 43C

Group: Tibia, distal end segment, complete, simple articular, simple metaphyseal fracture 43C1

Subgroups:
- Without impaction 43C1.1*
- With epiphyseal depression 43C1.2
- Extending into diaphysis 43C1.3

*Qualifications:
- Frontal/coronal plane
- Sagittal plane

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**Group:** Tibia, distal end segment, complete, **simple articular, multifragmentary metaphyseal fracture** 43C2

**Subgroups:**

- **With asymmetric impaction**
  - 43C2.1*

- **Without asymmetric impaction**
  - 43C2.2

- **Extending into diaphysis**
  - 43C2.3

*Qualifications:
- q Frontal/coronal plane
- r Sagittal plane

**Group:** Tibia, distal end segment, complete, **multifragmentary articular and metaphyseal fracture** 43C3

**Subgroups:**

- **Epiphyseal fracture**
  - 43C3.1

- **Epiphyseal-metaphyseal fracture**
  - 43C3.2

- **Epiphyseal-metaphyseal-diaphyseal fracture**
  - 43C3.3

**Qualifications** are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
**Fibula**

Bone: Fibula  4F

**4F1**

Location: Fibula, proximal end segment  4F1

Types:
- Fibula, proximal end segment, simple fracture  4F1A*
- Fibula, proximal end segment, multifragmentary fracture  4F1B*

*Qualifications:
- Extraarticular
- Intraarticular

→ To facilitate the coding of tibia/fibula fractures, they are now coded independently. The use of an “F” is required to designate the fibula.

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
4F2

**Location:** Fibula, diaphyseal segment 4F2

**Types:**
- Fibula, diaphyseal segment, simple fracture 4F2A*
- Fibula, diaphyseal segment, wedge or multifragmentary fracture 4F2B*

*Qualifications:
- a) Proximal 1/3
- b) Middle 1/3
- c) Distal 1/3
The fibular fracture code is used only if the distal fibula fracture is NOT part of a malleolar fracture (44). For further information, please refer to the Appendix.

**Location:** Fibula, distal end segment
(excluding lateral malleolar fractures 44) 4F3

**Types:**
- Distal end segment, simple fracture 4F3A
- Distal end segment wedge or multifragmentary fracture 4F3B

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Malleolar segment

**Location:** Tibia/fibula, malleolar segment 44

**Types:**
- Tibia/fibula, malleolar segment, infrasyndesmotic fibula injury 44A
- Tibia/fibula, malleolar segment, transsyndesmotic fibula fracture 44B
- Tibia/fibula, malleolar segment, suprasyndesmotic fibula fracture 44C

**44A**

**Type:** Tibia/fibula, malleolar segment, infrasyndesmotic fibula injury 44A

**Group:** Tibia/fibula, malleolar segment, infrasyndesmotic, isolated fibula injury 44A1

**Subgroups:**
- Rupture of the lateral collateral ligament 44A1.1
- Avulsion fracture of the tip of the lateral malleolus 44A1.2
- Transverse fracture of the lateral malleolus 44A1.3

**Qualifications** are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Group: Tibia/fibula, malleolar, infrasyndesmotic fibula injury with a medial malleolar fracture 44A2

Subgroups:
- Rupture of the lateral collateral ligament 44A2.1
- Avulsion fracture of the tip of the lateral malleolus 44A2.2
- Transverse fracture of the lateral malleolus 44A2.3

Group: Tibia/fibula, malleolar, infrasyndesmotic fibular injury with a posteromedial fracture 44A3

Subgroups:
- Rupture of the lateral collateral ligament with a posteromedial fracture 44A3.1
- Avulsion fracture of the tip of the lateral malleolus with a posteromedial fracture 44A3.2
- Transverse fracture of the lateral malleolus with a posteromedial fracture 44A3.3
44B

Type: Tibia/fibula, malleolar segment, transsyndesmotic fibula fracture 44B

Group: Tibia/fibula, malleolar segment, transsyndesmotic isolated fibula fracture 44B1

Subgroups:
- Simple fibula fracture 44B1.1*
- With a rupture of the anterior syndesmosis 44B1.2*
- Wedge or multifragmentary fibula fracture 44B1.3*

*Qualifications:
- n Tillaux-Chaput tubercle fracture
- o Wagstaffe-Le Fort avulsion fracture
- u Syndesmosis unstable

Group: Tibia/fibula, malleolar segment, transsyndesmotic fibula fracture with a medial injury 44B2

Subgroups:
- With a rupture of the deltoid ligament and anterior syndesmosis 44B2.1*
- With a medial malleolus fracture and a rupture of the anterior syndesmosis 44B2.2*
- Wedge or multifragmentary fibula fracture with medial injury 44B2.3*

*Qualifications:
- n Tillaux-Chaput tubercle fracture
- o Wagstaffe-Le Fort avulsion fracture
- u Syndesmosis unstable

- r Rupture of deltoid ligament
- s Fracture of medial malleolus
- u Syndesmosis unstable
**Group:** Tibia/fibula, malleolar segment, **transsyndesmotic fibula fracture with a medial injury and fracture of the posterolateral rim (Volkmann’s fragment)** 44B3

**Subgroups:**

- Simple, with a deltoid ligament rupture 44B3.1*
- Simple medial malleolus fracture 44B3.2*
- Wedge or multifragmentary fibular fracture with a fracture of the medial malleolus 44B3.3*

*Qualifications:
- Tillaux-Chaput tubercle fracture
- Wagstaffe-Le Fort avulsion fracture
- Syndesmosis unstable

**44C**

**Type:** Tibia/fibula, malleolar segment, **suprasyndesmotic fibula injury** 44C

**Group:** Tibia/fibula, malleolar segment, suprasyndesmotic, **simple diaphyseal fibula fracture** 44C1

**Subgroups:**

- With a rupture of the deltoid ligament 44C1.1*
- With a fracture of the medial malleolus 44C1.2*
- With a medial and a posterior malleolus fracture 44C1.3*

*Qualifications:
- Syndesmosis stable
- Syndesmosis unstable
Group: Tibia/fibula, malleolar segment, suprasyndesmotic, wedge or multifragmentary diaphyseal fibula fracture  44C2

Subgroups:
With a rupture of the deltoid ligament  44C2.1*
With a fracture of the medial malleolus  44C2.2*
With a fracture of the medial malleolus and posterior malleolus  44C2.3*

*Qualifications:
- t Syndesmosis stable
- u Syndesmosis unstable

Group: Tibia/fibula, malleolar segment, suprasyndesmotic, proximal fibula injury  44C3

Subgroups:
With a medial side injury  44C3.1*
With shortening and a medial side injury  44C3.2*
With a medial side injury and a posterior malleolus fracture  44C3.3*

*Qualifications:
- p Fibula neck fracture
- q Proximal tibio-fibular joint dislocation
- r Rupture of deltoid ligament
- s Fracture of medial malleolus

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Pelvic ring

Bone: Pelvis

Location: Pelvis, pelvic ring

Types:
Pelvis, pelvic ring, intact posterior arch
Pelvis, pelvic ring, incomplete disruption of posterior arch
Pelvis, pelvic ring, complete disruption of posterior arch

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
61A

Type: Pelvis, pelvic ring, intact posterior arch 61A

Group: Pelvis, pelvic ring, intact posterior arch, innominate bone avulsion fracture 61A1

Subgroups:
- Anterior superior iliac spine fracture 61A1.1
- Anterior inferior iliac spine fracture 61A1.2
- Ischial tuberosity fracture 61A1.3

Group: Pelvis, pelvic ring, intact posterior arch, innominate bone fracture 61A2

Subgroups:
- Iliac wing fracture 61A2.1
- Unilateral fracture of the anterior arch 61A2.2
- Bilateral fractures of the anterior arch 61A2.3

Group¹: Pelvis, pelvic ring, transverse fracture of sacrum (S3, S4, S5) and coccyx 61A3

¹Fracture of the upper sacral segments attached to sacroiliac joints (S1, S2) are classified as part of the pelvic ring injury. If a more detailed classification is required refer to sacral classification (S4) in the Spine classification.
**61B**

**Type:** Pelvis, pelvic ring, incomplete disruption of posterior arch 61B

**Group:** Pelvis, pelvic ring, incomplete disruption of posterior arch, no rotational instability 61B1

**Subgroups:**
- Lateral compression fracture (LC1) 61B1.1*
- Open book fracture (APC1) 61B1.2

*Qualifications:
- a Ipsilateral or unilateral pubic ramus fracture
- b Bilateral pubic ramus fracture
- c Contralateral pubic ramus fracture
- e Parasymphyseal fracture
- f Tilt fracture
- g Locked symphysis

**Group:** Pelvis, pelvic ring, incomplete disruption of posterior arch, rotationally unstable, unilateral posterior injury 61B2

**Subgroups:**
- Lateral compression fracture of the sacrum with internal rotation instability (LC1) 61B2.1*
- Lateral compression fracture of the ilium (crescent) with internal rotation instability (LC2) 61B2.2*
- Open book or external rotation instability (APC2) 61B2.3*

*Qualifications:
- a Ipsilateral or unilateral pubic ramus fractures
- b Bilateral pubic rami fractures
- c Contralateral pubic rami fractures
- d Symphysis disruption
- e Parasymphyseal fracture
- f Tilt fracture
- g Locked symphysis
**Group:** Pelvis, pelvic ring, incomplete disruption of posterior arch, rotationally unstable, **bilateral posterior injury** 61B3

**Subgroups:**
Internal rotationally unstable on one side and external rotationally unstable on the contralateral side (LC3) 61B3.1*

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>61B3.1*</td>
<td>Internal rotationally unstable on one side and external rotationally unstable on the contralateral side</td>
<td>LC3</td>
</tr>
</tbody>
</table>

*Qualifications:
- a. Ipsilateral or unilateral pubic ramus fractures
- b. Bilateral pubic rami fractures
- d. Symphysis disruption
- e. Parasymphyseal fracture
- f. Tilt fracture
- g. Locked symphysis

**61C**

**Type:** Pelvis, pelvic ring, **complete disruption of posterior arch** 61C

**Group:** Pelvis, pelvic ring, complete disruption of posterior arch,  **unilateral posterior injury (APC3, vertical shear)** 61C1

**Subgroups:**
With iliac fracture 61C1.1*

Through the sacroiliac joint 61C1.2*

With a sacral fracture 61C1.3*

<table>
<thead>
<tr>
<th>Subgroup</th>
<th>Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>61C1.1*</td>
<td>With iliac fracture</td>
<td></td>
</tr>
<tr>
<td>61C1.2*</td>
<td>Through the sacroiliac joint</td>
<td></td>
</tr>
<tr>
<td>61C1.3*</td>
<td>With a sacral fracture</td>
<td></td>
</tr>
</tbody>
</table>

*Qualifications:
- a. Ipsilateral or unilateral pubic ramus fracture
- b. Bilateral pubic rami fracture
- c. Contralateral pubic ramus fracture
- d. Symphysis disruption
- e. Parasymphyseal fracture
- f. Tilt fracture
- g. Locked symphysis
- j. Sacroiliac joint fracture dislocation
Group: Pelvis, pelvic ring, complete disruption of posterior arch, bilateral posterior injury, one hemipelvis injury complete disruption, contralateral hemipelvis injury incomplete disruption (LC3) 61C2

Subgroups:
- Complete disruption through ilium 61C2.1*
- Complete disruption through sacroiliac joint 61C2.2*
- Through the sacrum 61C2.3*

*Qualifications:
- a Ipsilateral or unilateral pubic ramus fracture
- b Bilateral pubic rami fracture
- c Contralateral pubic ramus fracture
- d Symphysis disruption
- e Parasymphyseal fracture
- f Tilt fracture
- g Locked symphysis
- h Contralateral posterior lateral compression lesion: sacrum
- i Contralateral posterior lateral compression lesion: ilium (crescent)
- k Contralateral posterior lateral compression lesion: sacroiliac joint
- m Contralateral posterior external rotation lesion: sacroiliac joint
- n Contralateral posterior external rotation lesion: fracture dislocation
- o Contralateral posterior lateral compression lesion: ilium

Group: Pelvis, pelvic ring, complete disruption of posterior arch, bilateral posterior injury, both sides complete disruption (APC3, vertical shear) 61C3

Subgroups:
- Extrasacral on both sides 61C3.1*
- Sacral one side, extra sacral other side 61C3.2*
- Sacral both sides 61C3.3*

*Qualifications:
- a Ipsilateral or unilateral pubic ramus fracture
- b Bilateral pubic rami fracture
- c Contralateral pubic ramus fracture
- d Symphysis disruption
e Parasymphyseal fracture
- f Tilt fracture
- g Locked symphysis
- h Iliac wing fracture
- i Sacroiliac joint disruption

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Acetabulum

Bone: Pelvis 6

Location: Pelvis, acetabulum 62

Types:
- Pelvis, acetabulum, partial articular, isolated column and/or wall fracture 62A
- Pelvis, acetabulum, partial articular, transverse type fracture 62B
- Pelvis, acetabulum, complete articular, associated both column fracture 62C

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
62A

Type: Pelvis, acetabulum, partial articular, isolated column and/or wall fracture 62A

Group: Pelvis, acetabulum, partial articular, isolated column and/or wall, posterior wall fracture 62A1

Subgroups:
Simple fracture
62A1.1*

Multifragmentary fracture
62A1.2*

*Qualification:
a With marginal impaction

Group: Pelvis, acetabulum, partial articular, isolated column and/or wall, posterior column fracture 62A2

Subgroups:
Through the ischium
62A2.1

Through the obturator ring
62A2.2

With associated posterior wall fracture
62A2.3*

*Qualifications:
h Simple posterior wall fracture
i Multifragmentary posterior wall fracture
j Posterior wall fracture with marginal impaction
**Group:** Pelvis, acetabulum, partial articular, isolated column or wall, **anterior column or wall fracture** 62A3

**Subgroups:**
- **Anterior wall fracture** 62A3.1*
- **High anterior column fracture (exits along iliac crest)** 62A3.2*
- **Low anterior column fracture (exits below anterior superior iliac spine [ASIS])** 62A3.3*

*Qualification:
- a With marginal impaction

---

**62B**

**Type:** Pelvis, acetabulum, **partial articular, transverse type fracture** 62B

**Group:** Pelvis, acetabulum, partial articular, transverse type, **transverse fracture** 62B1

**Subgroups:**
- **Infratectal fracture** 62B1.1*
- **Juxtatectal fracture** 62B1.2*
- **Transectal fracture** 62B1.3*

*Qualifications:
- b Associated posterior wall fracture
- c Associated posterior wall fracture with marginal impaction
Group: Pelvis, acetabulum, partial articular, transverse type, **T fracture** 62B2

Subgroups:
- With infratectal transverse component 62B2.1*
- With juxtatectal transverse component 62B2.2*
- With transtectal transverse component 62B2.3*

*Qualifications:
- Associated posterior wall fracture
- Associated posterior wall fracture with marginal impaction

Group: Pelvis, acetabulum, partial articular, transverse type, **with anterior column, posterior hemitransverse fracture** 62B3

Subgroups:
- Associated with anterior wall 62B3.1
- High anterior column fracture (exits along iliac crest) 62B3.2
- Low anterior column fracture (exits below anterior superior iliac spine [ASIS]) 62B3.3
62C

**Type:** Pelvis, acetabulum, complete articular, associated both column fracture

**Groups:**
- Pelvis, acetabulum, complete articular, both columns, high anterior column fracture (exits along iliac crest)
- Pelvis, acetabulum, complete articular, both columns, low anterior column fracture (exits below anterior superior iliac spine [ASIS])
- Pelvis, acetabulum, complete articular, both columns, involving the sacroiliac (SI) joint

**Qualifications:**
- Both columns simple
- Multifragmentary anterior column
- Multifragmentary posterior column
- Both columns multifragmentary

*Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.*

Based on the Letournel Classification of Acetabular Fractures:

Hand and carpus

Anatomical region: Hand and carpus

Bones:
- Hand and carpus, Lunate 71
- Hand and carpus, Scaphoid 72
- Hand and carpus, Capitate 73
- Hand and carpus, Hamate 74
- Hand and carpus, Trapezium 75
- Hand and carpus, Other carpal bones 76
- Hand and carpus, Metacarpal 77
- Hand and carpus, Phalanx 78
- Hand and carpus, Crushed, multiple fractures 79

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Lunate 71
Bone: Hand and carpus, lunate 71

Types:
Hand and carpus, lunate, avulsion fracture 71A
Hand and carpus, lunate, simple fracture 71B
Hand and carpus, lunate, multifragmentary fracture 71C

Scaphoid 72
Bone: Hand and carpus, scaphoid 72

Types:
Hand and carpus, scaphoid, avulsion fracture 72A
Hand and carpus, scaphoid, simple fracture 72B
Hand and carpus, scaphoid, multifragmentary fracture 72C

Capitate 73
Bone: Hand and carpus, capitate 73

Types:
Hand and carpus, capitate, avulsion fracture 73A
Hand and carpus, capitate, simple fracture 73B
Hand and carpus, capitate, multifragmentary fracture 73C

Hamate 74
Bone: Hand and carpus, hamate 74

Types:
Hand and carpus, hamate, hook fracture 74A
Hand and carpus, hamate, simple fracture 74B
Hand and carpus, hamate, multifragmentary fracture 74C

Trapezium 75
Bone: Hand and carpus, trapezium 75

Types:
Hand and carpus, trapezium, avulsion fracture 75A
Hand and carpus, trapezium, simple fracture 75B
Hand and carpus, trapezium, multifragmentary fracture 75C

*Qualifications:
- a Proximal pole
- b Waist
- c Distal pole
Other 76._

Bone: Hand and carpus, other 76._.

<table>
<thead>
<tr>
<th>Pisiform</th>
<th>Triquetrum</th>
<th>Trapezoid</th>
</tr>
</thead>
<tbody>
<tr>
<td>76.1</td>
<td>76.2</td>
<td>76.3</td>
</tr>
</tbody>
</table>

→ The bone identifier (between two dots __) is added to the code after the anatomical region.

76.1
Hand and carpus, pisiform 76.1.

Type:
Hand and carpus, other, pisiform, avulsion fracture 76.1.A
Hand and carpus, other, pisiform, simple fracture 76.1.B
Hand and carpus, other, pisiform, multifragmentary fracture 76.1.C

76.2
Hand and carpus, triquetrum 76.2.

Type:
Hand and carpus, other, triquetrum, avulsion fracture 76.2.A
Hand and carpus, other, triquetrum, simple fracture 76.2.B
Hand and carpus, other, triquetrum, multifragmentary fracture 76.2.C

76.3
Hand and carpus, trapezoid 76.3.

Type:
Hand and carpus, other, trapezoid, avulsion fracture 76.3.A
Hand and carpus, other, trapezoid, simple fracture 76.3.B
Hand and carpus, other, trapezoid, multifragmentary fracture 76.3.C
Metacarpals 77.__.

Bone: Hand and carpus, metacarpal 77.__.

→ The metacarpal bones are identified as follows: Thumb = 1, index = 2, long or middle = 3, ring = 4, and little = 5.
→ The metacarpal identifier is added (between two dots __.) after the bone code.
→ The bone segment location is then added.
→ Example: Hand, 3rd metacarpal, proximal end segment = 77.3.1

Location: Hand and carpus, metacarpal, proximal end segment 77.__.1
→ Example code for the 3rd metacarpal is indicated with an underline 77.3.1

Types:
- Hand and carpus, metacarpal, proximal end segment, extraarticular fracture
  77.3.1A
- Hand and carpus, metacarpal, proximal end segment, partial articular fracture
  77.3.1B
- Hand and carpus, metacarpal, proximal end segment, complete articular fracture
  77.3.1C

Location: Hand and carpus, metacarpal, diaphyseal fracture 77.__.2
→ Example code for the 3rd metacarpal is indicated with an underline 77.3.2

Types:
- Hand and carpus, metacarpal, diaphyseal, simple fracture
  77.3.2A
- Hand and carpus, metacarpal, diaphyseal, wedge fracture
  77.3.2B
- Hand and carpus, metacarpal, diaphyseal, multifragmentary fracture
  77.3.2C

Location: Hand and carpus, metacarpal, distal end segment 77.__.3
→ Example code for the 3rd metacarpal is indicated with an underline 77.3.3

Types:
- Hand and carpus, metacarpal, distal end segment, extraarticular fracture
  77.3.3A
- Hand and carpus, metacarpal, distal end segment, partial articular fracture
  77.3.3B
- Hand and carpus, metacarpal, distal end segment, complete articular fracture
  77.3.3C
The fingers and phalanges are identified as follows:

Fingers: Thumb = 1, index = 2, long or middle = 3, ring = 4, and little = 5.

Phalanges: Proximal phalanx = 1, middle phalanx = 2, and distal phalanx = 3.

The finger identifier plus phalanx identifier are added (between dots .______) after the bone code.

Example: Proximal thumb phalanx is 78.1.1.

The location is then added.

Anatomical region+bone.Finger.Phalanx.Bone segment location

Example: Proximal thumb phalanx proximal end segment is 78.1.1.1

Location: Hand and carpus, phalanx, proximal end segment 78.1.1.1

Example code for proximal thumb phalanx is indicated with an underline 78.1.1.1

Types:
Hand and carpus, phalanx, proximal end segment, extraarticular fracture 78.1.1.1A
Hand and carpus, phalanx, proximal end segment, partial articular fracture 78.1.1.1B
Hand and carpus, phalanx, proximal end segment, complete articular fracture 78.1.1.1C

Location: Hand and carpus, phalanx diaphyseal fracture 78.1.1.2

Example code for proximal thumb phalanx is indicated with an underline 78.1.1.2

Types:
Hand and carpus, phalanx, diaphyseal, simple fracture 78.1.1.2A
Hand and carpus, phalanx, diaphyseal, wedge fracture 78.1.1.2B
Hand and carpus, phalanx, diaphyseal, multifragmentary fracture 78.1.1.2C

Location: Hand and carpus, phalanx, distal end segment 78.1.1.3

Example code for proximal thumb phalanx is indicated with an underline 78.1.1.3

Types:
Hand and carpus, phalanx, distal end segment, extraarticular fracture 78.1.1.3A
Hand and carpus, phalanx, distal end segment, partial articular fracture 78.1.1.3B
Hand and carpus, phalanx, distal end segment, complete articular fracture 78.1.1.3C
Crushed, multiple fractures 79

Hand and carpus, crush, multiple fractures hand 79

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Foot

Anatomical region: Foot

Bones:
- Foot, Talus 81
- Foot, Calcaneus 82
- Foot, Navicular 83
- Foot, Cuboid 84
- Foot, Cuneiforms 85
- Foot, Metatarsals 87
- Foot, Phalanges 88
- Foot, Crush, multiple foot fractures 89

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Talus 81

Bone: Foot, talus 81

Locations:
- Foot, talus, body 81.1.
- Foot, talus, neck 81.2.
- Foot, talus, head 81.3.

→ The talus is anatomically identified as follows: body = 1, neck = 2, and head = 3.
→ The talar anatomical division is added (between two dots .__) after the bone code.

81.1.

Location: Foot, talus, body 81.1.

Types:
- Foot, talus, body, avulsion fracture 81.1.A
- Foot, talus, body, partial articular fracture 81.1.B
- Foot, talus, body, complete articular fracture 81.1.C

Type: Foot, talus, body, avulsion fracture 81.1.A

Groups:
- Foot, talus, body, avulsion fracture, anterior neck 81.1.A1
- Foot, talus, body, avulsion fracture, lateral process 81.1.A2
- Foot, talus, body, avulsion fracture, posterior process 81.1.A3
**Type:** Foot, talus, body, **partial articular fracture**  81.1.B

**Groups:**

- Foot, talus, body, partial articular, 
  **osteoarticular fracture**  
  81.1.B1
- Foot, talus, body, partial articular, 
  **simple fracture**  
  81.1.B2
- Talus, body, partial articular, 
  **fragmentary fracture**  
  81.1.B3

**Type:** Foot, talus, body, **complete articular fracture**  81.1.C

**Groups:**

- Foot, talus, body, complete articular, 
  **simple fracture**  
  81.1.C1
- Foot, talus, body, complete articular, 
  **multifragmentary fracture**  
  81.1.C3

**81.2.**

**Location:** Foot, talus, **neck fracture**  81.2.

**Types:**

- Foot, talus, neck, **nondisplaced** (Hawkins 1)  
  81.2.A
- Foot, talus, neck, **displaced with subtalar joint subluxation/dislocation** (Hawkins 2)  
  81.2.B*
- Foot, talus, neck, **displaced talar neck with talar body dislocation** (Hawkins 3)  
  81.2.C*
- Foot, talus, neck, **displaced talar neck with talar body and head dislocation** (Hawkins 4)  
  81.2.D*
81.3.

**Location:** Talus, head 81.3.

**Types:**
- Talus, head, **avulsion fracture** 81.3.A
- Talus, head, **partial articular fracture** 81.3.B*
- Talus, head, **complete articular fracture** 81.3.C*

*Qualifications:
- a Simple
- b Multifragmentary
Calcaneus 82

**Bone:** Foot, calcaneus 82

**Types:**
- Foot, calcaneus, *extraarticular fracture* 82A
- Foot, calcaneus, *tongue-type fracture exiting into posterior facet* 82B
- Foot, calcaneus, *complete articular joint depression* 82C

**82A**

*Type:* Foot, calcaneus, *extraarticular fracture* 82A

*Groups:*
- Foot calcaneus, extraarticular, *avulsion, posterior tuberosity fracture or extraarticular tongue fracture* 82A1
- Foot calcaneus, extraarticular, *body fracture* 82A2

**82B**

*Types:* Foot, calcaneus, *tongue-type fracture exiting into posterior facet* 82B

Foot, calcaneus, tongue-type fracture exiting into posterior facet, *tongue-type, simple fracture* 82B1

Foot, calcaneus, tongue-type fracture exiting into posterior facet, *multifragmentary fracture* 82B3
Type: Foot, calcaneus, complete articular joint depression fracture 82C

Groups:
- Foot, calcaneus, complete articular fracture, with joint depression (Sanders 2) 82C1
- Foot, calcaneus, complete articular fracture, with joint depression (Sanders 3) 82C2
- Foot, calcaneus, complete articular fracture, multifragmentary fracture (Sanders 4) 82C3
Navicular 83
Bone: Foot, navicular 83

Types:
Foot, navicular, \textit{avulsion fracture} 83A

Foot, navicular, \textit{partial articular fracture} 83B*

Foot, navicular, \textit{complete articular fracture} 83C*

*Qualifications:
\begin{itemize}
  \item \texttt{a} Simple
  \item \texttt{b} Multifragmentary
\end{itemize}

Cuboid 84
Bone: Foot, cuboid 84

Types:
Foot, cuboid, \textit{avulsion fracture} 84A

Foot, cuboid, \textit{partial articular fracture} 84B*

Foot, cuboid, \textit{complete articular fracture} 84C*

*Qualifications:
\begin{itemize}
  \item \texttt{a} Simple
  \item \texttt{b} Multifragmentary
\end{itemize}
Cuneiform 85.__.

Bone: Foot, cuneiform 85.__.

Locations:
Foot, cuneiform, medial
85.1.

Foot, cuneiform, middle
85.2.

Foot, cuneiform, lateral
85.3.

→ The cuneiform locations are identified as follows: medial = 1, middle = 2, and lateral = 3.
→ The cuneiform location is added (between two dots __) after the bone code.

85.1.

Types:
Foot, cuneiform, medial,
avulsion fracture
85.1.A

Foot, cuneiform, medial,
partial articular fracture
85.1.B

Foot, cuneiform, medial,
complete articular fracture
85.1.C

85.2.

Types:
Foot, cuneiform, middle,
avulsion fracture
85.2.A

Foot, cuneiform, middle,
partial articular fracture
85.2.B

Foot, cuneiform, middle,
complete articular fracture
85.2.C

85.3.

Types:
Foot, cuneiform, lateral,
avulsion fracture
85.3.A

Foot, cuneiform, lateral,
partial articular fracture
85.3.B

Foot, cuneiform, lateral,
complete articular fracture
85.3.C
Metatarsals 87

Bone: Foot, metatarsal 87

→ The metatarsal bones are identified as follows: First metatarsal = 1, second metatarsal = 2, third metatarsal = 3, fourth metatarsal = 4, fifth metatarsal = 5.
→ The metatarsal identifier is added (between two dots __.) after the bone code.
→ The bone segment location is then added.
→ Example: Foot, third metatarsal, proximal end segment = 87.3.1

Locations:
Foot, metatarsal,
proximal end segment 87__.1
Foot, metatarsal,
diaphyseal segment 87__.2
Foot, metatarsal,
distal end segment 87__.3

87__.1
Location: Foot, metatarsal, proximal end segment 87__.1
→ Example code for the third metatarsal is indicated with an underline 87.3.1

Types:
Foot, metatarsal, proximal end segment,
extraarticular fracture 87.3.1A*
Foot, metatarsal, proximal end segment,
partial articular fracture 87.3.1B*
Foot, metatarsal, proximal end segment,
complete articular fracture 87.3.1C*

*Qualifications:
a Simple
b Multifragmentary
87.3.2

**Location:** Foot, metatarsal, **diaphyseal segment** 87.3.2

→ Example code for the third metatarsal is indicated with an underline 87.3.2

**Types:**
- Foot, metatarsal, diaphyseal segment, **simple fracture** 87.3.2A
- Foot, metatarsal, diaphyseal segment, **wedge fracture** 87.3.2B
- Foot, metatarsal, diaphyseal segment, **multifragmentary fracture** 87.3.2C

87.3.3

**Location:** Foot, metatarsal, **distal end segment** 87.3.3

→ Example code for the third metatarsal is indicated with an underline 87.3.3

**Types:**
- Foot, metatarsal, distal end segment, **extraarticular fracture** 87.3.3A*
- Foot, metatarsal, distal end segment, **partial articular fracture** 87.3.3B*
- Foot, metatarsal, distal end segment, **complete articular fracture** 87.3.3C*

*Qualifications:
- a Simple
- b Multifragmentary
Phalanx 88

Bone: Foot, phalanx 88

→ The toes and phalanges are identified as follows:
  Toes: First or great toe = 1, second toe = 2, third toe = 3, fourth toe= 4, and fifth toe = 5.
  Phalanges: Proximal phalanx = 1, middle phalanx = 2, and distal phalanx = 3.
→ The toe identifier plus phalanx identifier are added (between dots .___.) after the bone code.
→ Example: Great toe, middle phalanx fracture is 88.1.2.
→ The phalangeal bone segment location is then added.

Anatomical region + bone. Toe. Phalanx. Bone segment location + Type
→ Example: Great toe, middle phalanx, proximal end segment is 88.1.2.1

Locations:

<table>
<thead>
<tr>
<th>Bone Segment Location</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proximal end segment</td>
<td>88.1.2.1</td>
</tr>
<tr>
<td>Diaphyseal segment</td>
<td>88.1.2.2</td>
</tr>
<tr>
<td>Distal end segment</td>
<td>88.1.2.3</td>
</tr>
</tbody>
</table>

88..1..1

Location: Foot, phalanx, proximal end segment 88.1.2.1
→ Example code for the proximal great toe is indicated with an underline 88.1.2.1

Types:

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraarticular fracture</td>
<td>88.1.2.1A</td>
</tr>
<tr>
<td>Partial articular fracture</td>
<td>88.1.2.1B</td>
</tr>
<tr>
<td>Complete articular fracture</td>
<td>88.1.2.1C</td>
</tr>
</tbody>
</table>

88..2..2

Location: Foot, phalanx, diaphyseal segment 88.1.2.2
→ Example code for the proximal great toe is indicated with an underline 88.1.2.2

Types:

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple fracture</td>
<td>88.1.2.2A</td>
</tr>
<tr>
<td>Wedge fracture</td>
<td>88.1.2.2B</td>
</tr>
<tr>
<td>Multifragmentary fracture</td>
<td>88.1.2.2C</td>
</tr>
</tbody>
</table>

88..2..3

Location: Foot, phalanx, distal end segment 88.1.2.3
→ Example code for the proximal great toe is indicated with an underline 88.1.2.3

Types:

<table>
<thead>
<tr>
<th>Type</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extraarticular fracture</td>
<td>88.1.2.3A</td>
</tr>
<tr>
<td>Partial articular fracture</td>
<td>88.1.2.3B</td>
</tr>
<tr>
<td>Complete articular fracture</td>
<td>88.1.2.3C</td>
</tr>
</tbody>
</table>
### 89

**Location:** Foot, crush, multiple fractures whole foot 89

**Types:**  
- Foot, crush, multiple fractures, hindfoot 89A  
- Foot, crush, multiple fractures, midfoot 89B  
- Foot, crush, multiple fractures, forefoot 89C

---

**Qualifications** are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Scapula

Bone: Scapula

14

Locations:
Scapula, process 14A
Scapula, body 14B*
Scapula, glenoid fossa 14F*

* Qualifications for process fractures:
  x Coracoid P1
  y Acromion P2
  z Both processes P3
(These qualifications may be added to any fracture coded as type B or type F)

14A

Location: Scapula, process 14A

Types:
Scapula, process, coracoid fracture 14A1
Scapula, process, acromion fracture 14A2
Scapula, process, spine fracture 14A3

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
14B

**Location:** Scapula, **body** 14B

**Types:**
- Scapula, body, fracture exits the body at 2 or less points
  14B1*
- Scapula, body, fracture exits the body at 3 or more points
  14B2*

**Qualifications:**
- Lateral border fracture exit
- Medial border fracture exit
- Superior border fracture exit
- Area immediately lateral to base of coracoid (glenoid side exit)

14F

**Location:** Scapula, **glenoid fossa** 14F

**Type:**
- Scapula, glenoid fossa, through the extraarticular subchondral bone of the glenoid fossa (glenoid neck) 14F0
Type: Scapula, glenoid fossa, simple fracture 14F1

Groups:
Scapula, glenoid fossa, simple, anterior rim fracture 14F1.1*
Scapula, glenoid fossa, simple, posterior rim fracture 14F1.2*
Scapula, glenoid fossa, simple, transverse or short oblique fracture 14F1.3*

*Qualifications:
- f Infraequatorial rim fracture located in lower quadrant
- r Rim fracture anterior or posterior to maximum glenoid meridian with exits superior and inferior to the glenoid equatorial line
- t Fracture is located in two infraequatorial anterior and posterior quadrants with side of fracture defined by the center of fracture line

→ For more information about the four glenoid fossa quadrants, please refer to the Appendix.
Type: Scapula, glenoid fossa, multifragmentary (three or more fracture lines) 14F2

Groups:
Scapula, glenoid fossa, multifragmentary (3 or more articular fragments), glenoid fossa fracture 14F2.1
Scapula, glenoid fossa, multifragmentary (3 or more articular fragments with rim exits), central fracture dislocation 14F2.2

NOTE: Glenoid fractures with extension into the body are classified as a glenoid fracture, with the body fracture code added to the end of the code in square brackets [ ].

References


Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Clavicle

Bone: Clavicle 15

Locations:

Clavicle, **proximal (medial) end segment** 15.1

Location is determined by a square with sides the length of the widest portion of the medial end of the clavicle.

Clavicle, **diaphyseal segment** 15.2

The portion between the two end segments.

Clavicle, **distal (lateral) end segment** 15.3

Begins at line perpendicular to the medial edge of the coracoid process. The coracoclavicular ligaments are part of this lateral end segment.

Location: Clavicle, **proximal (medial) end segment** 15.1

Types:

Clavicle, proximal (medial) end segment, **extraarticular fracture including epiphyseal plate injury** 15.1A

Clavicle, proximal (medial) end segment, **partial articular fracture** 15.1B

Clavicle, proximal (medial) end segment, **complete articular fracture** 15.1C

Location: Clavicle, **diaphyseal segment** 15.2

Types:

Clavicle, diaphyseal, **simple fracture** 15.2A

Clavicle, diaphyseal, **wedge fracture** 15.2B

Clavicle, diaphyseal, **multifragmentary fracture** 15.2C

Location: Clavicle, **distal (lateral) end segment** 15.3

Types:

Clavicle, distal (lateral) end segment, **extraarticular fracture** 15.3A*

Clavicle, distal (lateral) end segment, **partial articular fracture** 15.3B*

Clavicle, distal (lateral) end segment, **complete articular fracture** 15.3C*

*Qualifications:

a CC ligament complex intact
b CC ligament complex, partial disruption
c CC ligament complex, complete disruption

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.

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OTA Open Fracture Classification (OTA-OFC)

The open fracture classification was developed by the OTA classification committee to address the limitation of the Gustilo-Anderson classification. The OTA-OFC is designed to be used at the time of initial debridement by the treating surgeon. It is generic, usable on all anatomical areas, and focused on factors related to injury not treatment.

| Skin  | 1. Laceration with edges that approximate.  
|       | 2. Laceration with edges that do not approximate.  
|       | 3. Laceration associated with extensive degloving. |
| Muscle| 1. No appreciable muscle necrosis, some muscle injury with intact muscle function.  
|       | 2. Loss of muscle but the muscle remains functional, some localized necrosis in the zone of injury that requires excision, intact muscle-tendon unit.  
|       | 3. Dead muscle, loss of muscle function, partial or complete compartment excision, complete disruption of a muscle-tendon unit, muscle defect does not reapproximate. |
| Arterial| 1. No major vessel disruption.  
|        | 2. Vessel injury without distal ischemia.  
|        | 3. Vessel injury with distal ischemia. |
| Contamination| 1. None or minimal contamination.  
|            | 2. Surface contamination (not ground in).  
|            | 3. Contaminant embedded in bone or deep soft tissues or high-risk environmental conditions (eg, barnyard, fecal, dirty water). |
| Bone loss| 1. None.  
|          | 2. Bone missing or devascularized bone fragments, but still some contact between proximal and distal fragments.  

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Reference

Dislocations

The coding is as follows:

• The first number represents the distal bone of the dislocated joint.
• The second number is 0 which represents the dislocation (with the exception of the shoulder girdle where all dislocations are 10).
• The third character (A, B, C, D, and E) is used when there are more than two bone articulations in the anatomical region.
• The direction of the dislocation is coded using the universal modifier for dislocation direction, within square brackets [5_].

10
Anatomical region: Shoulder girdle 10

Locations:

- Shoulder girdle, **glenohumeral** 10A[5_]
- Shoulder girdle, **acromioclavicular** 10B[5_]
- Shoulder girdle, **sternoclavicular** 10C[5_]
- Shoulder girdle, **scapulothoracic** 10D[5_]

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Anatomical region: Elbow

Locations:
- Elbow, ulnohumeral with radiohumeral
- Elbow, radiohumeral
- Elbow, ulnohumeral
30

Anatomical region: Hip joint 30[5_]
**Anatomical region: Knee**

**Locations:**
- Knee, tibiofemoral (40A)
- Knee, patellofemoral (40B)
- Knee, tibiofibular proximal (40C)

*Qualifications:
- a KD1—Multiligamentous rupture with either cruciate intact
- b KDII—Bicruciate rupture with collateral ligaments intact
- c KDIIIM—Bicruciate rupture with medial collateral ligament rupture
- d KDIII—Bicruciate rupture with lateral collateral ligament rupture
- e KDIV—MCL, LCL, ACL, PCL rupture
- f KDV—Fracture dislocation
- g associated arterial injury
- h associated nerve injury

More specific coding would use the fracture code and universal modifier for dislocation and direction.1,2
70

Anatomical region: Hand and wrist

Locations:

- Hand and wrist, distal radioulnar joint
  70A[5_]

- Hand and wrist, radiocarpal joint
  70B[5_]

- Hand and wrist, intercarpal joint
  70C[5_]

- Hand and wrist, carpal-metacarpal joint
  70D[5_]

- Hand and wrist, phalangeal joint
  70E[5_]
70D

Location: Hand and wrist, carpal-metacarpal joint 70D

Types: Hand and wrist, carpal-metacarpal joint, 1st metacarpal-trapezial joint 70D1[5_
Hand and wrist, carpal-metacarpal joint, 2nd metacarpal-trapezoid joint 70D2[5_
Hand and wrist, carpal-metacarpal joint, 3rd metacarpal capitate joint 70D3[5_
Hand and wrist, carpal-metacarpal joint, 4th metacarpal hamate joint 70D4[5_
Hand and wrist, carpal-metacarpal joint, 5th metacarpal triquetrum joint 70D5[5_
Hand and wrist, carpal-metacarpal joint, multiple carpal-metacarpal joint 70D6[5_]
70E

**Location:** Hand and wrist, phalangeal joint 70E

**Type:** Hand and wrist, phalangeal joint, metacarpal phalangeal joint 70E1

The interphalangeal joints are identified as follows: thumb = 1, index = 2, long or middle = 3, ring = 4, and little = 5.

The identifier is added to the code after the type code.

**Groups:**
- Hand and wrist, phalangeal joint, 1st metacarpal phalangeal joint 70E1.1
- Hand and wrist, phalangeal joint, 2nd metacarpal phalangeal joint 70E1.2
- Hand and wrist, phalangeal joint, 3rd metacarpal phalangeal joint 70E1.3
- Hand and wrist, phalangeal joint, 4th metacarpal phalangeal joint 70E1.4
- Hand and wrist, phalangeal joint, 5th metacarpal phalangeal joint 70E1.5

**Type:** Hand and wrist, phalangeal joint, proximal interphalangeal joint 70E2

**Groups:**
- Hand and wrist, phalangeal joint, proximal interphalangeal joint, thumb (1st) 70E2.1
- Hand and wrist, phalangeal joint, proximal interphalangeal joint, index (2nd) 70E2.2
- Hand and wrist, phalangeal joint, proximal interphalangeal joint, long (3rd) 70E2.3
- Hand and wrist, phalangeal joint, proximal interphalangeal joint, ring (4th) 70E2.4
- Hand and wrist, phalangeal joint, proximal interphalangeal joint, little (5th) 70E2.5

**Type:** Hand and wrist, phalangeal joint, distal interphalangeal joint 70E3

**Groups:**
- Hand and wrist, phalangeal joint, distal interphalangeal joint, index (2nd) 70E3.2
- Hand and wrist, phalangeal joint, distal interphalangeal joint, long (3rd) 70E3.3
- Hand and wrist, phalangeal joint, distal interphalangeal joint, ring (4th) 70E3.4
- Hand and wrist, phalangeal joint, distal interphalangeal joint, little (5th) 70E3.5

**Type:** Hand and wrist, sesamoid joint dislocation 70E4

**Type:** Hand and wrist, multiple phalangeal joint dislocations 70E5
Anatomical region: Foot and ankle

Locations:

- Foot and ankle, syndesmosis
- Foot and ankle, ankle joint (tibiotalar/talocrural)
- Foot and ankle, hindfoot (subtalar joint)
- Foot and ankle, midfoot
- Foot and ankle, forefoot
Location: Foot and ankle, *midfoot* 80D

Types: Foot and ankle, midfoot, *talonavicular joint* 80D1[5_
Foot and ankle, midfoot, *calcaneocuboid joint* 80D2[5_
Foot and ankle, midfoot, *navicular-cuneiform joint* 80D3[5_
Foot and ankle, midfoot, *intercuneiform joint* 80D4[5_
Foot and ankle, midfoot, *tarsal-metatarsal joint* 80D5

Groups: Foot and ankle, midfoot, tarsal-metatarsal joint, *1st metatarsal medial cuneiform* 80D5.1[5_
Foot and ankle, midfoot, tarsal-metatarsal joint, *2nd metatarsal middle cuneiform* 80D5.2[5_
Foot and ankle, midfoot, tarsal-metatarsal joint, *3rd metatarsal lateral cuneiform* 80D5.3[5_
Foot and ankle, midfoot, tarsal-metatarsal joint, *4th metatarsal cuboid* 80D5.4[5_
Foot and ankle, midfoot, tarsal-metatarsal joint, *5th metatarsal cuboid* 80D5.5[5_
Foot and ankle, midfoot, tarsal-metatarsal joint, *multiple metatarsal-tarsal* 80D5.6[5_
Foot and ankle, midfoot, *multiple joint dislocations* 80D6

Type: Foot and ankle, midfoot, *multiple joint dislocations* 80D6
80E

Location: Foot and ankle, forefoot 80E

Type: Foot and ankle, forefoot, phalangeal joint 80E1

Groups (by joint medial to lateral): Foot and ankle, forefoot, phalangeal joint, 1st metatarsal phalangeal joint 80E1.1
     Foot and ankle, forefoot, phalangeal joint, 2nd metatarsal phalangeal joint 80E1.2
     Foot and ankle, forefoot, phalangeal joint, 3rd metatarsal phalangeal joint 80E1.3
     Foot and ankle, forefoot, phalangeal joint, 4th metatarsal phalangeal joint 80E1.4
     Foot and ankle, forefoot, phalangeal joint, 5th metatarsal phalangeal joint 80E1.5

Type: Forefoot, phalangeal joint, proximal interphalangeal joint 80E2

Groups (by joint medial to lateral): Forefoot, phalangeal joint, proximal interphalangeal joint, 1st toe (IP joint as there is no DIP in great toe) 80E2.1
     Forefoot, phalangeal joint, proximal interphalangeal joint, 2nd toe 80E2.2
     Forefoot, phalangeal joint, proximal interphalangeal joint, 3rd toe 80E2.3
     Forefoot, phalangeal joint, proximal interphalangeal joint, 4th toe 80E2.4
     Forefoot, phalangeal joint, proximal interphalangeal joint, 5th toe 80E2.5

Type: Forefoot, phalangeal joint, distal interphalangeal joint 80E3

Groups (by joint medial to lateral): Forefoot, phalangeal joint, distal interphalangeal joint, 2nd toe 80E3.2
     Forefoot, phalangeal joint, distal interphalangeal joint, 3rd toe 80E3.3
     Forefoot, phalangeal joint, distal interphalangeal joint, 4th toe 80E3.4
     Forefoot, phalangeal joint, distal interphalangeal joint, 5th toe 80E3.5

Type: Foot and ankle, forefoot, sesamoid dislocation (any) 80E4

Type: Foot and ankle, forefoot, multiple dislocations 80E5

References


Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
AO Pediatric Comprehensive Classification of Long Bone Fractures (PCCF)

Introduction

In adult fractures the injury severity and fracture pattern are important. In pediatric fractures another component is added—the phenomenon of growth. Previous classifications of children’s fractures are very specific, but not universal in application1–6 and none have been scientifically validated.7–9 Finally, there is no classification system available for diaphyseal long bone fractures. Any classification for pediatric fractures must be applicable for all fractures and recognize the importance of growth through the epiphyseal plate. To address these needs, the validated AO Pediatric Comprehensive Classification of Long Bone Fractures (PCCF)1 was introduced to the AO/OTA Compendium of Fractures and Dislocations in 2007.10–12

The principles and definitions of the pediatric long bone fracture classification

The terminology and coding of the PCCF are based on the principles found in Müller’s Long Bone Comprehensive Classification of Fractures.13 This system only addresses the four long bones.

Bone

The bones are coded: Humerus (1), Radius (2r), Ulna (2u), Femur (3), Tibia (4t) and Fibula (4f) (Fig 1). Note that the paired bones radius/ulna or tibia/fibula are classified as individual bones (Fig 2) allowing the detailed documentation of combined fractures of the radius and ulna, or the tibia and fibula.

<table>
<thead>
<tr>
<th>Code</th>
<th>Fracture</th>
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</thead>
<tbody>
<tr>
<td>23r − E/2.1</td>
<td>Salter Harris II fracture of the distal radius</td>
</tr>
<tr>
<td>23u − E/2.1</td>
<td>Salter Harris II fracture of the distal ulna</td>
</tr>
</tbody>
</table>

Fig 1 Designation of bone location.

Fig 2 Coding of same fracture but different bone in paired bones.

Fracture location

The location within the bones is the proximal end segment (1), diaphyseal segment (2), and, distal end segment (3). The end segment consists of the epiphysis and metaphysis. The metaphyseal end segment is determined by a square whose sides are the same length as the widest part of the visible epiphyseal growth plate (Fig 3).11 For the radius/ulna and tibia/fibula, both bones must be included in the square.

Consequently, the three segments can be defined as:
- Proximal end segment (1) and distal end segment (3)
  - Subsegments are the epiphysis (E) and metaphysis (square) (M)
  - Diaphyseal segment (2)
- Subsegment is the section between two end segments (D).

Fig 3 Definition of bone segments and types. For children, the square must be placed over the larger part of the physis.
Malleolar fractures are infrequent in children and do not justify a specific coding. They are simply coded as distal end segment tibia and/or fibula fractures.

The subsegments follow the segment and are the diaphysis (D), metaphysis (M) and epiphysis (E) (Fig 3). Epiphyseal fractures are by definition intraarticular fractures. (Fig 3 and Fig 4). The square definition is not applied to the proximal femur where metaphyseal fractures are located between the physis of the head and the intertrochanteric line.

Fig 4 Use of the square patterns to classify a fracture as epiphyseal (E), metaphyseal (M) or diaphyseal (D). The square patterns are copied onto a transparency sheet and applied over the radiograph for more reliable and accurate diagnosis.

Fracture displacement may distort the fracture fragment’s exact anatomy so the end segment square may not be accurate necessitating reclassification after the fracture reduction.

**Child code**

A forward slash “/” (Fig 5) is used to identify the specific child fracture codes:

- Epiphyseal fracture codes (Fig 6)
- Specific metaphyseal fracture child codes (Fig 7)
- Specific diaphyseal fracture child codes (Fig 8)

**Fig 5** Overall structure of the pediatric fracture classification
Fig 6 Definition of child patterns for epiphyseal fractures.

Salter-Harris (SH) type I
E/1

Salter-Harris (SH) type II
E/2

Salter-Harris (SH) type III
E/3

Tillaux (two-plane)
E/4

Tri-plane
E/5

E/6

E/7

E/8

E/9

Fig 7 Definition of child patterns for metaphyseal fractures.

Incomplete: torus/buckle, or greenstick M/2

Avulsion
M/7

Complete
M/3

Other fractures
M/9

Incomplete: torus/buckle, or greenstick M/2

Avulsion
M/7

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**Fracture severity code**

This code distinguishes between two grades of fracture severity: simple (.1) and multifragmentary (.2) (Fig 9).

**.1 Simple**

Two main fragments

**.2 Multifragmentary**

Two main fragments and at least one intermediate fragment

Fig 9 Severity implies anticipated difficulties and method of treatment, not the prognosis.

**Qualifications**

These codes are added as roman numerals between rounded brackets at the end of the fracture code, e.g. 13-M/3.1(III). These are described by an additional code for the grade of angulation.
Humerus 1

Proximal epiphyseal fractures 11-E

Simple
Epiphysiolysis, SH I 11-E/1.1

Epiphysiolysis with metaphyseal wedge, SH II 11-E/2.1

Epiphyseal, SH III 11-E/3.1

Multifragmentary
Simple
Epi-/metaphyseal, SH IV 11-E/4.1

Epiphysiolysis with metaphyseal wedge, SH II 11-E/2.2

Intraarticular flake 11-E/8.1

Epiphyseal, SH III 11-E/3.2

Intraarticular flake 11-E/8.2

Proximal metaphyseal fractures 11-M

Torus/buckle 11-M/2.1

Complete 11-M/3.1

Complete 11-M/3.2
### Diaphyseal fractures 12-D

<table>
<thead>
<tr>
<th>Simple</th>
<th>Multifragmentary</th>
<th>Simple</th>
<th>Multifragmentary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Complete transverse (&lt; 30°)</strong> 12-D/4.1</td>
<td><strong>Complete transverse (&lt; 30°)</strong> 12-D/4.2</td>
<td><strong>Complete oblique or spiral (&gt; 30°)</strong> 12-D/5.1</td>
<td><strong>Complete oblique or spiral (&gt; 30°)</strong> 12-D/5.2</td>
</tr>
</tbody>
</table>

### Distal metaphyseal fractures 13-M

<table>
<thead>
<tr>
<th>Simple</th>
<th>Multifragmentary</th>
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</thead>
<tbody>
<tr>
<td><strong>Incomplete, nondisplaced</strong> 13-M/3.1 I</td>
<td><strong>Incomplete, displaced</strong> 13-M/3.1 II</td>
</tr>
<tr>
<td><img src="image1" alt="Diaphyseal fractures 12-D" /></td>
<td><img src="image2" alt="Diaphyseal fractures 12-D" /></td>
</tr>
<tr>
<td><strong>Incomplete, displaced</strong> 13-M/3.1 II</td>
<td><strong>Complete with contact between fracture planes</strong> 13-M/3.1 III</td>
</tr>
<tr>
<td><img src="image3" alt="Diaphyseal fractures 12-D" /></td>
<td><img src="image4" alt="Diaphyseal fractures 12-D" /></td>
</tr>
<tr>
<td><strong>Complete with contact between fracture planes</strong> 13-M/3.1 III</td>
<td><strong>Complete with contact between fracture planes</strong> 13-M/3.2 III</td>
</tr>
<tr>
<td><img src="image5" alt="Diaphyseal fractures 12-D" /></td>
<td><img src="image6" alt="Diaphyseal fractures 12-D" /></td>
</tr>
</tbody>
</table>
**Simple**

Complete without contact between fracture planes 13-M/3.1 IV

Avulsion of the epicondyle (extraarticular) 13-M/7m

**Multifragmentary**

Complete without contact between fracture planes 13-M/3.2 IV

---

**Distal epiphyseal fractures 13-E**

**Simple**

Epiphysiolysis, SH I 13-E/1.1

Epiphysiolysis with metaphyseal wedge, SH II 13-E/2.1

Epiphyseal, SH III 13-E/3.1

**Multifragmentary**

Epi-/metaphyseal, SH IV 13-E/4.1

Epi-/metaphyseal, SH IV 13-E/4.2

Avulsion of/by the collateral ligament 13-E/7

Intraarticular flake 13-E/8.1

Intraarticular flake 13-E/8.2
**Radius/ulna 2**

**Proximal epiphyseal fractures 21-E**

**Isolated fractures of the radius**

<table>
<thead>
<tr>
<th>Simple</th>
<th>Multifragmentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epiphysiolysis, SH I, no angulation and no displacement 21r-E/1.1 I*</td>
<td>Epiphysiolysis with metaphyseal wedge, SH II, no angulation and no displacement 21r-E/2.1 I*</td>
</tr>
<tr>
<td>Epiphysiolysis, SH I, angulation with displacement of up to half of the bone diameter 21r-E/1.1 II*</td>
<td>Epiphysiolysis with metaphyseal wedge, SH II, angulation with displacement of up to half of the bone diameter 21r-E/2.1 II*</td>
</tr>
<tr>
<td>Epiphysiolysis, SH I, angulation with displacement of more than half of the bone diameter 21r-E/1.1 III*</td>
<td>Epiphysiolysis with metaphyseal wedge, SH II, angulation with displacement of more than half of the bone diameter 21r-E/2.1 III*</td>
</tr>
</tbody>
</table>

Epiphyseal, SH III 21r-E/3.1

Epiphyseal, SH III 21r-E/3.2

Epi-/metaphyseal, SH IV 21r-E/4.1

Epi-/metaphyseal, SH IV 21r-E/4.2

*Qualifications for displaced radial head and neck fractures:
- 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
**Proximal metaphyseal fractures 21-M**

**Isolated fractures of the radius**

**Torus/buckle** 21r-M/2.1

![Torus/buckle diagram](image)

**Complete, no angulation and no displacement** 21r-M/3.1 II

![Complete, no angulation and no displacement diagram](image)

**Complete, angulation with displacement of up to half of the bone diameter** 21r-M/3.1 II

![Complete, angulation with displacement diagram](image)

**Complete, angulation with displacement of up to half of the bone diameter** 21r-M/3.2 II

![Complete, angulation with displacement diagram](image)

**Isolated fractures of the ulna**

**Torus/buckle** 21u-M/2.1

![Torus/buckle diagram](image)

**Complete** 21u-M/3.1

![Complete diagram](image)

**Complete** 21u-M/3.2

![Complete diagram](image)

**Avulsion of the apophysis** 21u-M/7

![Avulsion diagram](image)

**Greenstick, dorsal radial head dislocation (Bado II)** 21u-M/6.1

![Greenstick, dorsal radial head dislocation diagram](image)

**Greenstick, lateral radial head dislocation (Bado III)** 21u-M/6.1

![Greenstick, lateral radial head dislocation diagram](image)
Diaphyseal fractures 22-D
Fractures of both bones

Simple

Bowing 22-D/1.1

Multifragmentary

Complete transverse (< 30°) 22-D/4.1

Complete transverse (< 30°) 22-D/4.2

Greenstick 22-D/2.1

Complete oblique or spiral (> 30°) 22-D/5.1

Complete oblique or spiral (> 30°) 22-D/5.2

Isolated fractures of the radius

Bowing 22r-D/1.1

Complete transverse (< 30°) 22r-D/4.1

Complete transverse (< 30°) 22r-D/4.2

Greenstick 22r-D/2.1

Complete oblique or spiral (> 30°) 22r-D/5.1

Complete oblique or spiral (> 30°) 22r-D/5.2
Isolated fractures of the ulna

**Bowing** 22u-D/1.1

**Complete transverse (< 30°)** 22u-D/4.1

**Complete transverse (< 30°)** 22u-D/4.2

Isolated fractures of the radius

**Greenstick** 22u-D/2.1

**Complete oblique or spiral (≥ 30°)** 22u-D/5.1

**Complete oblique or spiral (≥ 30°)** 22u-D/5.2

**Monteggia** 22u-D/6.1

**Monteggia** 22u-D/6.2
Distal metaphyseal fractures 23-M

Fractures of both bones

<table>
<thead>
<tr>
<th>Simple</th>
<th>Multifragmentary</th>
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<tbody>
<tr>
<td>Torus/buckle 23-M/2.1</td>
<td>Complete 23-M/3.1</td>
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</table>

Isolated fractures of the radius

| Torus/buckle 23r-M/2.1 | Complete 23r-M/3.1 | Complete 23r-M/3.2 |

Isolated fractures of the ulna

| Torus/buckle 23u-M/2.1 | Complete 23u-M/3.1 | Complete 23u-M/3.2 |

Distal epiphyseal fractures 23-E

Fractures of both bones

<table>
<thead>
<tr>
<th>Epiphysiolsis, SH I 23-E/1</th>
<th>Epi-/metaphyseal, SH IV 23-E/4.1</th>
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<tbody>
<tr>
<td>Epiphysiolsis with metaphyseal wedge, SH II 23-E/2.1</td>
<td>Avulsion of the styloid 23-E/7</td>
</tr>
<tr>
<td>Epiphysiolsis with metaphyseal wedge, SH II 23-E/2.2</td>
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### Isolated fractures of the radius 23-E

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<tbody>
<tr>
<td><strong>Epiphyseal, SH III</strong> 23-E/3</td>
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<table>
<thead>
<tr>
<th>Isolated fractures of the ulna 23-E</th>
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</table>

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<tbody>
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<td><strong>Epiphyseal, SH III</strong> 23-E/3</td>
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### Isolated fractures of the radius 23-E

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<tbody>
<tr>
<td><strong>Epiphyseal, SH III</strong> 23-E/3</td>
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</table>

<table>
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<tr>
<th>Isolated fractures of the ulna 23-E</th>
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</table>

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</tr>
</thead>
<tbody>
<tr>
<td><strong>Epiphyseal, SH III</strong> 23-E/3</td>
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### Isolated fractures of the radius 23-E

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<tbody>
<tr>
<td><strong>Epiphyseal, SH III</strong> 23-E/3</td>
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</table>

<table>
<thead>
<tr>
<th>Isolated fractures of the ulna 23-E</th>
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</thead>
</table>

<table>
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<tr>
<td><strong>Epiphyseal, SH III</strong> 23-E/3</td>
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</table>
### 3 Femur

#### Proximal epiphyseal fractures 31-E

<table>
<thead>
<tr>
<th>Simple</th>
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</thead>
<tbody>
<tr>
<td>Epiphysiolysis (SUFE/SCFE), SH I 31-E/1.1</td>
<td></td>
</tr>
<tr>
<td>Epiphysiolysis (SUFE/SCFE) with metaphyseal wedge, SH II 31-E/2.1</td>
<td></td>
</tr>
<tr>
<td>Avulsion of/by the ligament of the head of the femur 31-E/7</td>
<td>Intraarticular flake 31-E/8.1</td>
</tr>
<tr>
<td>Intraarticular flake 31-E/8.2</td>
<td></td>
</tr>
</tbody>
</table>

#### Proximal metaphyseal fractures 31-M

<table>
<thead>
<tr>
<th>Incomplete midcervical 31-M/2.1 I*</th>
<th>Complete midcervical 31-M/3.1 I*</th>
<th>Complete midcervical 31-M/3.2 I*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Incomplete basicervical 31-M/2.1 II*</td>
<td>Complete basicervical 31-M/3.1 II*</td>
<td>Complete basicervical 31-M/3.2 II*</td>
</tr>
<tr>
<td>Incomplete transtrochanteric 31-M/2.1 III*</td>
<td>Complete transtrochanteric 31-M/3.1 III*</td>
<td>Complete transtrochanteric 31-M/3.2 III*</td>
</tr>
<tr>
<td>Avulsion of the greater or lesser trochanter 31-M/7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Qualifications for femoral neck fractures:*

- Type I  Midcervical
- Type II  Basicervical
- Type III  Transtrochanteric
**Diaphyseal fractures 32-D**

<table>
<thead>
<tr>
<th>Simple</th>
<th>Multifragmentary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Complete transverse</strong> (<em>&lt; 30°</em>) 32-D/4.1</td>
<td><strong>Complete transverse</strong> (<em>&lt; 30°</em>) 32-D/4.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Simple</th>
<th>Multifragmentary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Complete oblique or spiral</strong> (<em>≥ 30°</em>) 32-D/5.1</td>
<td><strong>Complete oblique or spiral</strong> (<em>≥ 30°</em>) 32-D/5.2</td>
</tr>
</tbody>
</table>

**Distal metaphyseal fractures 33-M**

<table>
<thead>
<tr>
<th>Torus/buckle 33-M/2.1</th>
<th>Bilateral avulsion 33-M/7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Complete</strong> 33-M/3.1</td>
<td><strong>Complete</strong> 33-M/3.2</td>
</tr>
</tbody>
</table>

| Medial avulsion 33-M/7m | Lateral avulsion 33-M/7l |
Distal epiphyseal fractures 33-E

Epiphysiolysis, SH I 33-E/1.1

Epiphysiolysis with metaphyseal wedge, SH II 33-E/2.1

Simple

Epiphyseal, SH III 33-E/3.1

Epiphysiolysis, SH I 33-E/1.1

Epiphysiolysis with metaphyseal wedge, SH II 33-E/2.2

Multifragmentary

Epi-/metaphyseal, SH IV 33-E/4.1

Epiphysiolysis with metaphyseal wedge, SH II 33-E/2.2

Simple

Epiphysiolysis, SH I 33-E/1.1

Intraarticular flake 33-E/8.1

Multifragmentary

Epi-/metaphyseal, SH IV 33-E/4.2

Intraarticular flake 33-E/8.2
Tibia/fibula 4

Proximal epiphyseal fractures 41-E

Isolated fractures of the tibia

- Epiphysiolysis, SH I
  41t-E/1.1

- Epiphysiolysis, with metaphyseal wedge, SH II
  41t-E/2.1

- Epiphysiolysis, SH III
  41t-E/3.1

- Epiphysiolysis, with metaphyseal wedge, SH II
  41t-E/2.2

- Epiphysiolysis, SH III
  41t-E/3.2

- Epi-/metaphyseal, SH IV
  41t-E/4.1

- Epi-/metaphyseal, SH IV
  41t-E/4.2

- Avulsion of the tibial spine
  41t-E/7

- Intraarticular flake
  41t-E/8.1

- Intraarticular flake
  41t-E/8.2
Proximal metaphyseal fractures 41-M

Fractures of both bones

**Torus/buckle** 41-M/2.1

**Complete** 41-M/3.1

**Complete** 41-M/3.2

Isolated fractures of the tibia

**Torus/buckle** 41t-M/2.1

**Complete** 41t-M/3.1

**Complete** 41t-M/3.2

**Avulsion of the apophysis** 41t-M/7

Isolated fractures of the fibula

**Torus/buckle** 41f-M/2.1

**Complete** 41f-M/3.1

**Complete** 41f-M/3.2
Diaphyseal fractures 42-D

**Fractures of both bones**

<table>
<thead>
<tr>
<th>Simple</th>
<th>Multifragmentary</th>
<th>Simple</th>
<th>Multifragmentary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bowling</strong> 42-D/1.1</td>
<td></td>
<td><strong>Complete transverse (&lt; 30°)</strong> 42-D/4.1</td>
<td></td>
</tr>
<tr>
<td><img src="image1.png" alt="Diagram" /></td>
<td></td>
<td><img src="image2.png" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td><strong>Greenstick</strong> 42-D/2.1</td>
<td></td>
<td><strong>Complete oblique or spiral (&gt; 30°)</strong> 42-D/5.1</td>
<td></td>
</tr>
<tr>
<td><img src="image3.png" alt="Diagram" /></td>
<td></td>
<td><img src="image4.png" alt="Diagram" /></td>
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</table>

**Isolated fractures of the tibia**

<table>
<thead>
<tr>
<th>Simple</th>
<th>Multifragmentary</th>
<th>Simple</th>
<th>Multifragmentary</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bowling</strong> 42t-D/1.1</td>
<td></td>
<td><strong>Complete transverse (&lt; 30°)</strong> 42t-D/4.1</td>
<td></td>
</tr>
<tr>
<td><img src="image5.png" alt="Diagram" /></td>
<td></td>
<td><img src="image6.png" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td><strong>Greenstick</strong> 42t-D/2.1</td>
<td></td>
<td><strong>Complete oblique or spiral (&gt; 30°)</strong> 42t-D/5.1</td>
<td></td>
</tr>
<tr>
<td><img src="image7.png" alt="Diagram" /></td>
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<td><img src="image8.png" alt="Diagram" /></td>
<td></td>
</tr>
<tr>
<td><strong>Toddler fracture</strong> 42t-D/3.1</td>
<td></td>
<td><strong>Complete oblique or spiral (&gt; 30°)</strong> 42t-D/5.2</td>
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<tr>
<td><img src="image9.png" alt="Diagram" /></td>
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<td><img src="image10.png" alt="Diagram" /></td>
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</tbody>
</table>
Isolated fractures of the fibula

Simple

Bowling 42f-D/1.1

Greenstick 42f-D/2.1

Multifragmenteary

Simple

Complete transverse (< 30°) 42f-D/4.1

Complete oblique or spiral (> 30°) 42f-D/5.1

Complete transverse (< 30°) 42f-D/4.2

Complete oblique or spiral (> 30°) 42f-D/5.2

Distal metaphyseal fractures 43-M

Fractures of both bones

Torus/buckle 43-M/2.1

Complete 43-M/3.1

Complete 43-M/3.2

Isolated fractures of the tibia

Torus/buckle 43t-M/2.1

Complete 43t-M/3.1

Complete 43t-M/3.2

Isolated fractures of the fibula

Torus/buckle 43f-M/2.1

Complete 43f-M/3.1

Complete 43f-M/3.2
Distal epiphyseal fractures 43-E

Fractures of both bones

<table>
<thead>
<tr>
<th>Simple</th>
<th>Multifragmentary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epiphysiolysis, SH I 43-E/1.1</td>
<td>Epi-/metaphyseal, SH IV 43-E/4.1</td>
</tr>
<tr>
<td>Epiphysiolysis with metaphyseal wedge, SH II 43-E/2.1</td>
<td>Intraarticular flake 43-E/8.1</td>
</tr>
<tr>
<td>Epiphyseal, SH III 43-E/3.1</td>
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Isolated fracture of the tibia

<table>
<thead>
<tr>
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<th>Multifragmentary</th>
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<tbody>
<tr>
<td>Epiphysiolysis, SH I 43t-E/1.1</td>
<td>Epi-/metaphyseal, SH IV 43t-E/4.1</td>
</tr>
<tr>
<td>Epiphysiolysis with metaphyseal wedge, SH II 43t-E/2.1</td>
<td>Epi-/metaphyseal, SH IV 43t-E/4.2</td>
</tr>
<tr>
<td>Epiphysiolysis with metaphyseal wedge, SH II 43t-E/2.2</td>
<td>Tillaux (two-plane), SH III 43t-E/5.1</td>
</tr>
</tbody>
</table>
### Simple

- **Epiphyseal, SH III** 43t-E/3.1
- **Intraarticular flake** 43t-E/8.1

### Multifragmentary

- **Tri-plane, SH IV** 43t-E/6.1

### Isolated fractures of the fibula

- **Epiphysiolysis, SH I** 43f-E/1.1
- **Epiphysiolysis with metaphyseal wedge, SH II** 43f-E/2.1
- **Epiphyseal, SH III** 43f-E/3.1
- **Avulsion** 43f-E/7
- **Intraarticular flake** 43f-E/8.1
Frequent fracture combinations

**Radius/ulna**

- Complete radial neck fracture type III and olecranon fracture 21r-M/3.1 III, 21u-M/3.1
- Radial SH II and avulsion of the ulnar styloid 23r-E/2.1, 23u-E/7
- Simple oblique or spiral complete radial fracture and bowing ulnar fracture 22r-D/5.1, 22u-D/1.1

**Torus/buckle fracture of the radius and complete metaphyseal ulnar fracture** 23r-M/2.1, 23u-M/3.1

**Tibia/fibula**

- Proximal: SH II tibial fracture and complete metaphyseal fibular fracture 41t-E/2.1, 41f-M/3.1
- SH III tibial and SH I fibular fracture 43t-E/4.1, 43f-E/1.1
- Complete transverse (< 30°) tibial fracture and bowing fibular fracture 42t-D/4.1, 42f-D/1.1

**Multifragmentary epiphyseal tibia SH II and SH I fibular fracture** 43t-E/2.2, 43f-E/1.1

- Multifragmentary oblique or spiral (> 30°) tibial fracture and fibular greenstick fracture 42t-D/5.2, 42f-D/2.1
- Distal: SH II tibial fracture and complete metaphyseal fibular fracture 43t-E/2.1, 43f-M/3.1
References


Unified Classification System for Periprosthetic Fractures (UCPF)

Principles
The UCPF is based upon the following factors:
1. The fracture location may involve either the bone supporting the implant or distant to it.
2. The stability of the components must be assessed to determine if the bone implant surface is stable prior to fracture and after fracture.
3. The adequacy of the bone stock and bone strength supporting the implant must be sufficient to support internal fixation or a revision without additional major reconstruction.
4. For clinical use, the definitions and terminology of the UCPF are used. In order to maintain consistency in coding and allow easy data retrieval for data collection, the UCPF has been modified so that the AO/OTA bone code appears first.
5. The UCPF code follows as a qualification in square brackets.
6. Fractures about or in a bone with a nonarthroplasty implant are coded using the universal modifier [12] following the AO/OTA fracture code.

Classification and coding process
1. The bone is identified by the AO/OTA code (see Fig 1). The fracture morphology maybe classified in as much detail as needed.
2. The UCPF for the joint involved is added as a modifier in square brackets [ ] after the bone code (see Fig 1).
3. The fracture type is based on the location of the fracture in relation to the implant as follows:
   • Apophysis adjacent implant with no effect on implant stability—Type A
   • Tuberosities of the humerus
   • Epicondyles or olecranon of distal humerus
   • Trochanters and epicondyles of femur
   • Spines of the pelvis
   • Poles or tips of the patella
   • Tibial tuberosity and malleoli
   • Bed of the implant or around the implant—Type B
   • Good bone no implant loosening—Type B1
   • Good bone but implant loose—Type B2
   • Poor bone or defect, implant loose—Type B3
   • Clear of the implant—Type C
   • Dividing the bone between two implants—Type D
   • Each of the two bones supporting the implant—Type E
   • Facing and articulating with a hemiarthroplasty—Type F

The table provides the unified codes that follow the fracture classification.

Example: A spiral fracture about a femoral prosthesis of a total hip, which on x-rays shows loosening of the implant but good bone stock = 32A1[IVB2]

AO/OTA codes:
- Humerus 1
- Radius 2R
- Ulna 2U
- Carpus and hand 7
- Scapula 14
- Pelvis 61
- Acetabulum 62
- Femur 3
- Patella 34
- Tibia 4
- Fibula 4F
- Ankle 44
- Foot 8

UCPF codes:
- Shoulder I
- Elbow II
- Wrist III
- Hip IV
- Knee V
- Ankle VI

Fig 1  AO/OTA bone codes and UCPF joint codes.
<table>
<thead>
<tr>
<th>Type</th>
<th>I.14</th>
<th>L1</th>
<th>II.1</th>
<th>II.2</th>
<th>III.2</th>
<th>III.7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glenoid/scapula</td>
<td>Glenoid/scapula</td>
<td>Glenoid implant stable, good bone</td>
<td>Glenoid implant stable, good bone</td>
<td>Glenoid implant stable, good bone</td>
<td>Glenoid implant stable, good bone</td>
<td>Glenoid implant stable, good bone</td>
</tr>
<tr>
<td>Humerus, proximal</td>
<td>Humerus, proximal</td>
<td>Humeral implant stable, good bone</td>
<td>Humeral implant stable, good bone</td>
<td>Humeral implant stable, good bone</td>
<td>Humeral implant stable, good bone</td>
<td>Humeral implant stable, good bone</td>
</tr>
<tr>
<td>II.1</td>
<td>II.2</td>
<td>III.2</td>
<td>III.7</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lateral epicondyle</td>
<td>Olecranon tip</td>
<td>Radial styloid</td>
<td>Carpal/metacarpal implant stable, good bone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A</td>
<td>Apophyseal or extraarticular/periarticular</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>Apophyseal</td>
<td>Coracoid process</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>Avulsion of</td>
<td>Acromion</td>
<td>Lesser tuberosity</td>
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</tr>
<tr>
<td>B</td>
<td>Bed of the implant or around the implant</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>Prosthesis stable, good bone</td>
<td>Glenoid implant stable, good bone</td>
<td>Humeral implant stable, good bone</td>
<td>Humeral implant stable, good bone</td>
<td>Ulnar implant loose, poor bone, defect</td>
<td>Carpal/metacarpal implant loose, poor bone, defect</td>
</tr>
<tr>
<td>B2</td>
<td>Prosthesis loose, good bone</td>
<td>Glenoid implant loose, good bone</td>
<td>Humeral implant loose, good bone</td>
<td>Humeral implant loose, good bone</td>
<td>Ulnar implant loose, poor bone, defect</td>
<td>Carpal/metacarpal implant loose, poor bone, defect</td>
</tr>
<tr>
<td>B3</td>
<td>Prosthesis loose, poor bone or bone defect</td>
<td>Glenoid implant loose, poor bone, defect</td>
<td>Humeral implant loose, poor bone, defect</td>
<td>Humeral implant loose, poor bone, defect</td>
<td>Ulnar implant loose, poor bone, defect</td>
<td>Carpal/metacarpal implant loose, poor bone, defect</td>
</tr>
<tr>
<td>C</td>
<td>Clear of or distant to the implant</td>
<td>Body of the scapula</td>
<td>Distal to the implant</td>
<td>Proximal to the implant</td>
<td>Distal to the implant</td>
<td>Proximal to the implant</td>
</tr>
<tr>
<td>D</td>
<td>Dividing the bone between two implants or interprosthetic or intercalary</td>
<td></td>
<td>Between shoulder and elbow arthroplasties, close to the shoulder</td>
<td>Between shoulder and elbow arthroplasties, close to the elbow</td>
<td>Between wrist and radial-head prosthesis</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>Each of two bones supporting one arthroplasty or polyperiprosthetic</td>
<td>Scapula and humerus</td>
<td>Humerus and ulna/radius</td>
<td>Radius/ulna and carpus/metacarpals</td>
<td></td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>Facing and articulating with a hemiarthroplasty</td>
<td>Fracture of the glenoid articulating with the humeral hemiarthroplasty</td>
<td>Distal humeral fracture articulating with the radial-head prosthesis</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### IV  Hip
- Acetabulum/pelvis
- Anterior inferior and superior iliac spine
- Ischial tuberosity
- Acetabular rim or good bone
- Loose cup, good bone
- Loose cup, poor bone, defect; Pelvic discontinuity
- Pelvic/acetabular fractures distant to the implant

### V  Knee
- Femur, proximal
- Greater trochanter
- Medial epicondyle
- Stem stable, good bone; Surface replacement: femoral neck
- Loose stem, good bone; Surface replacement: loose implant, no proximal femoral bone loss
- Loose stem, poor bone, defect; Surface replacement: loose implant, bone loss
- Distal to the implant and cement mantle
- Between hip and knee arthroplasties, close to the hip
- Pelvis and femur

### VI  Ankle
- Patella
- Medial or lateral plateau, nondisplaced
- Tibial tubercle
- Loose component/ stem, poor bone defect
- Proximal to the implant and cement mantle
- Between ankle and knee arthroplasties, close to the knee
- Fracture of the acetabulum articulating with the femoral hemiarthroplasty

### Type
- A  Apophyseal or extraarticular/periarticular
- B  Bed of the implant or around the implant
- C  Clear of or distant to the implant
- D  Dividing the bone between two implants or interprosthetic or intercalary
- E  Each of two bones supporting one arthroplasty or polyprosthetic
- F  Facing and articulating with a hemiarthroplasty

### Reference

Spine

Diagnostic and coding process

This classification system includes morphological injury characteristics, as well as neurological and patient-specific modifiers to augment the clinical relevance.

Algorithm for morphologic classification

Bone: Spine 5

Locations: Spine, Cervical 51, Thoracic 52, Lumbar 53, and Sacrum 54

→ The vertebral body number is added between two dots . . after the location code. Example: Fracture of thoracic vertebra 7 is 52.7

→ The motion segment—the numbers of the two vertebral bodies involved are separated by a back slash between two dots / / placed after the location code. Example: Fracture dislocation of thoracic vertebra 7 on 8 is 52.7/8.
Cervical spine

Location: Spine, upper cervical (C1 or C2) 51.___X
• The classification for this region is presently under development
• The axial spine is defined as cervical vertebra 1 and 2
• The generic fracture code 51.___X is used to code these injuries

Location: Spine, subaxial cervical spine (vertebra 3 to 7)

Types:
Spine, subaxial cervical, compression injury of the vertebral body 51.__.A
Spine, subaxial cervical, tension band injury 51.__.B
Spine, subaxial cervical, displacement/translational injury 51.__.C

51.__.A
Type: Spine, subaxial cervical, compression injury of the vertebral body 51.__.A

Group: Spine, subaxial cervical, compression injury, minor nonstructural fracture (eg, spinous process) 51.__.A0

Group: Spine, subaxial cervical, compression injury, compression or impaction fractures of a single endplate without involvement of the posterior wall of the vertebral body 51.__.A1

Group: Spine, subaxial cervical, compression injury, coronal split of pincers type fractures involving both end plates without posterior vertebral wall involvement 51.__.A2
Group: Spine, cervical, compression injuries, **incomplete burst fractures** involving a single endplate with any involvement of the posterior vertebral wall 51.A3

Group: Spine, cervical, compression injuries, **complete burst fractures** involving both endplates as well as the posterior vertebral wall 51.A4
**51._B**

**Type:** Spine, subaxial cervical, tension band injury 51._B

**Group:** Spine, subaxial cervical, tension band injury, monosegmental osseous failure of the posterior tension band extending into vertebral body (Chance Fracture) 51._B1*

![Image](image1.png)

**Group:** Spine, subaxial cervical, tension band injury, disruption of the posterior tension band with or without osseous involvement. Posterior tension band injury maybe bone, capsule or ligament or a combination 51._B2*

![Image](image2.png)

**Group:** Spine, subaxial cervical, tension band injury, anterior tension band injury with physical disruption or separation of the anterior structures (bone/disk) with a tethering of the posterior elements 51._B3*

![Image](image3.png)
**51.C**

Type: Spine, subaxial cervical, displacement/translational injury 51.C

*Qualifications:

bl = Bilateral posterior injuries

F = Facet Injuries

F1: Nondisplaced facet injuries (fragment <1 cm and < 40% of lateral mass)

F2: Facet fracture with potential for instability (fragment >1 cm and >40% of lateral mass or displaced)
F3: Floating lateral mass

F4: Subluxation of perched/dislocated facet

Qualifications for neurological deficit grades (applicable to all cervical spine codes):
These grades are added to any spinal code to identify the neurological deficit. They are added to the end of code between (__). Multiple qualifications are separated by a comma.
• NX cannot be examined
• N0 neurologically intact
• N1 transient neurological deficit
• N2 nerve root injury
• N3 cauda equina injury or incomplete spinal cord injury
• N4 complete spinal cord injury (unlikely in sacral fractures)
• + ongoing cord compression in the setting of an incomplete neurological deficit.

Qualifications for patient specific conditions (applicable to all cervical spine codes):
• M1 posterior capsuloligamentous complex injury without complete disruption
• M2 critical disk herniation
• M3 Stiffening/metabolic bone disease (ie, DISH, AS, OPL, OLF)
• M4 Vertebral artery abnormality.

Qualifications are added at the end of the code between rounded brackets (__.)
Thoracic or Lumbar spine

**Location:** Spine, thoracic 52.__. or lumbar 53.__.

**Types:**
- Spine, thoracic or lumbar, compression injury of the vertebral body 52.__.A or 53.__.A
- Spine, thoracic or lumbar, tension band injury 52.__.B or 53.__.B
- Spine thoracic or lumbar, displacement/translational Injury 52.__.C or 53.__.C

**52.__.A or 53.__.A**

**Type:** Spine, thoracic or lumbar, compression injury of the vertebra 52.__.A or 53.__.A

**Group:** Spine, thoracic or lumbar, compression injury of the vertebra, minor nonstructural fractures (ie, spinous or transverse processes) 52.__.A0 or 53.__.A0

**Group:** Spine, thoracic or lumbar, compression injury of the vertebra, compression or impaction fractures of a single endplate without involvement of the posterior wall of the vertebral body 52.__.A1 or 53.__.A1
Group: Spine, thoracic or lumbar, compression injury of the vertebra, coronal split of pincers type fractures involving both endplates without posterior vertebral wall involvement
52.__A2 or 53.__A2

Group: Spine, thoracic or lumbar, compression injury to the vertebra, incomplete burst fracture involving a single endplate with any involvement of the posterior vertebral wall
52.__A3 or 53.__A3

Group: Spine, thoracic or lumbar, compression injury to the vertebra, complete burst fracture involving both endplates as well as the posterior wall
52.__A4 or 53.__A4
52.__.B or 53.__.B

Type: Spine, thoracic or lumbar, tension band injury 52.__.B or 53.__.B

Group: Spine, thoracic or lumbar, distraction injury, monosegmental osseous failure of the posterior tension band extending into the vertebral body (Chance fracture) 52.__.B1 or 53.__.B1

Group: Spine, thoracic or lumbar, distraction injury, disruption of the posterior tension band with or without osseous involvement. Posterior tension band injury maybe bone, capsule, ligament or a combination 52.__.B2 or 53.__.B2

Group: Spine, thoracic or lumbar, distraction injury, anterior tension band injury with disruption or separation of the anterior bone and/or disc with tethering of the posterior elements 52.__.B3 or 53.__.B3
52.__.C/53.__.C

Type: Spine, thoracic or lumbar, displacement/translational injury

Failure of all elements leading to dislocation, displacement or translation in any plane or complete disruption of a soft tissue hinge even in the absence of any translation. Can be combined with subtypes of A and B allowing for two separate codes for the injury.

Qualifications for neurological deficit grades (applicable to all thoracic or lumbar spine codes):

These grades are added to any spinal code to identify the neurological deficit. They are added to the end of code between ( __ ). Multiple qualifications are separated by a comma.

- NX cannot be examined
- N0 neurologically intact
- N1 transient neurological deficit
- N2 nerve root injury
- N3 cauda equina injury or incomplete spinal cord injury
- N4 complete spinal cord injury
- + Indicates there is ongoing cord compression in the setting of an incomplete neurological deficit.

Qualifications for patient specific conditions (applicable to all thoracic or lumbar spine codes):

- M1 Used to designate fractures with an indeterminate injury to the tension band based on spinal imaging with or without MRI. This modifier is important for designating those injuries with stable injuries from a bony standpoint for which ligamentous insufficiency may help determine whether operative stabilization is a consideration.
- M2 Used to designate a patient-specific comorbidity, which might argue either for or against surgery for patients with relative surgical indications. Examples of an M2 modifier include ankylosing spondylitis or burns affecting the skin overlying the injured spine.
Sacral spine

**Location:** Spine, sacrum 54

This classification is intended to be used for isolated sacral fractures not associated with a pelvic ring injury. As the sacrum is part of the posterior pelvic ring arch, sacral fractures are a major component of determining the stability of a pelvic ring injury. Consequently, sacral fractures associated with a pelvic ring injury (61) are recommended to be classified in that category using the qualification modifiers.

**54A**

**Type:** Spine, sacrum, fractures of the lower segments not associated with sacroiliac joint. (Injuries with no impact on pelvic or spino-pelvis stability. They may have a neurological injury.) 54A

**Group:** Spine, sacrum, fractures of the lower sacral segments not associated with sacroiliac joint, coccygeal or sacral compression injuries 54A1

**Group:** Spine, sacrum, fractures of the lower sacral segments not associated with sacroiliac joint, transverse fractures, nondisplaced 54A2
Group: Spine, sacrum, fractures of the lower sacral segments not associated with sacroiliac joint, **transverse fractures, displaced** 54A3

**54B**

Type: Spine, sacrum, fractures involving the upper sacral segments associated with sacroiliac joint 54B

These are unilateral longitudinal or vertical fractures that occur through the upper sacral segments that are associated with the sacroiliac joint. These will have an impact on pelvic stability. They may have neurological injury. The groups are ordered differently than the published Denis classification or the former compendiums.

Group: Spine, sacrum, fractures involving the upper sacral segments associated with sacroiliac joint, **isolated vertical central fractures medial to the foramina involving the spinal canal (Denis III)** 54B1

Group: Spine, sacrum, fractures involving the upper sacral segments associated with sacroiliac joint, **transalar fractures lateral to the foramina or spinal canal (Denis I)** 54B2
Group: Spine, sacrum, fractures involving the upper sacral segments associated with sacroiliac joint, transforaminal fractures involving the foramina but not the spinal canal (Denis II) 54B3

54C

Type: Spine, sacrum, injuries resulting in spino-pelvic instability 55C

Group: Spine, sacrum, injuries resulting in spino-pelvic instability, non-displaced U-type variant (commonly low energy insufficiency fracture) 55C0
**Group:** Spine, sacrum, injury resulting in spino-pelvic instability, **U-type variant without posterior pelvic instability** (any unilateral B group fracture where ipsilateral S1 facet is discontinuous with medial part of sacrum) 54C1

**Group:** Spine, sacrum, injury resulting in spino-pelvic instability, **bilateral complete B-type injuries without transverse fracture** 54C2

**Group:** Spine, sacrum, injury resulting in spino-pelvic instability, **displaced U-type fracture** 54C3
Qualifications for neurological deficit grades (applicable to all sacral spine codes):

These grades are added to any spinal code to identify the neurological deficit. They are added to the end of code between ( __ ). Multiple qualifications are separated by a comma.

- NX cannot be examined
- N0 neurologically intact
- N1 transient neurological deficit
- N2 nerve root injury
- N3 cauda equina injury or incomplete spinal cord injury

Qualifications for patient specific conditions (applicable to all sacral spine codes):

- M1 soft tissue injury
- M2 metabolic bone disease
- M3 Anterior pelvic ring injury
- M4 Sacroiliac joint injury

References


Thorax

Anatomical location: Thorax

Bone: Thorax, Rib*

The ribs are identified as follows:
- **Right side** = 16.1.__.
- **Left side** = 16.2.__.
- **Rib number** = 1 to 12

→ The body side and rib number are added to the code (between dots . . . after the bone code.
  Example: Left second rib is 16.2.2.
→ Bone.left or right.rib number.location

**Locations:**
- Rib, posterior end segment
  16.__.__.1

The portion of the rib from the costovertebral joint to the tip of the transverse process (costotransverse articulations).

→ The location number is added after the bone code and rib number identifier.
  Example: Left second rib, posterior segment fracture is 16.2.2.1

**Types:**
- Rib, posterior end segment, *extraarticular fracture*
  16.__.__.1A*

- Rib, posterior end segment, *partial costotransverse disruption*
  16.__.__.1B*

- Rib, posterior end segment, *complete costotransverse disruption*
  16.__.__.1C*

**Location:** Rib, posterior end segment
  16.__.__.1

Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Location: Rib, shaft 16.__.__.2

Types:
- Rib, shaft, simple fracture 16.__.__.2A*
- Rib, shaft, multifragmentary wedge fracture 16.__.__.2B*
- Rib, shaft, multifragmentary segmental fracture 16.__.__.2C*

Location: Rib, anterior end segment 16.__.__.3

Types:
- Rib, anterior end segment, simple fracture 16.__.__.3A*
- Rib, anterior end segment, wedge fracture 16.__.__.3B*
- Rib, anterior end segment, multifragmentary fracture 16.__.__.3C*

*Qualification for all rib fractures:
f Flail segment—for each fracture that is part of a flail segment
s Fracture series—for each fracture that is part of a rib fractures series

→ The type character is added after the location code.
Example: Right 9th rib, shaft, simple lateral fracture 16.1.9.2A

Coding of multiple fractures
Use a separate code for each fractured rib.
Thorax—Sternum

Bone: Thorax, Sternum 16.3..

Locations:

- Sternum, manubrium fracture 16.3.1
- Sternum, body fracture 16.3.2
- Sternum, xiphoid fracture 16.3.3

→ The location number is added to the code between two dots after the bone code.

Location: Sternum, manubrium fracture 16.3.1.

Types:
- Sternum, manubrium, transverse fracture 16.3.1.A
- Sternum, manubrium, oblique fracture 16.3.1.B
- Sternum, manubrium, multifragmentary fracture 16.3.1.C
Location: Sternum, body fracture 16.3.2.

Types:
- Stemum body fracture, transverse (sagittal instability) fracture 16.3.2.A
- Stemum body fracture, oblique fracture 16.3.2.B
- Stemum body fracture, multifragmentary fracture 16.3.2.C

Example: Simple fracture of sternal body 16.3.2.A

Location: Sternum, xiphoid fracture 16.3.3.

Types:
- Stemum, xiphoid, transverse fracture or avulsion (sagittal instability) 16.3.3.A
- Stemum, xiphoid, oblique fracture (partial avulsion) 16.3.3.B
- Stemum, xiphoid, multifragmentary fracture 16.3.3.C
Universal fracture modifiers for the thorax section only

- Universal modifiers may be added to the end of the fracture code within squared brackets [1]
- Multiple universal modifiers may be contained within the same set of squared brackets and separated by a comma and no space [1,2,3,etc]

<table>
<thead>
<tr>
<th></th>
<th>Fracture Modifier</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lung contusion</td>
</tr>
<tr>
<td>2</td>
<td>Pneumothorax</td>
</tr>
<tr>
<td>3</td>
<td>Hemothorax</td>
</tr>
<tr>
<td>4</td>
<td>Cardiac injury</td>
</tr>
<tr>
<td>5</td>
<td>Great vessel injury</td>
</tr>
<tr>
<td>6</td>
<td>Intercostal artery injury</td>
</tr>
<tr>
<td>7</td>
<td>Soft tissue injury</td>
</tr>
</tbody>
</table>

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Qualifications are optional and applied to the fracture code where the asterisk is located as a lower-case letter within rounded brackets. More than one qualification can be applied for a given fracture classification, separated by a comma. For a more detailed explanation, see the compendium introduction.
Appendix

In this section, guides to help the coder classify fractures are provided. Within each bone segment, references are made to this section if specific definitions or suggestions for coding are required.

Radius and Ulna

To facilitate the coding of radius and ulna fractures, they are coded by the individual bone. The following guidelines are suggested:

• The location of the end segment requires that the square has as its side dimension the widest part of the end segment, which includes both the radius and ulna (Fig 1).

[Fig 1] Determine the location of the end segment.

• Each fracture is coded, stored, and searched for separately i.e., as two codes.

• **Galeazzi** and **Monteggia** fracture codes:

  – Galeazzi and Monteggia fracture patterns consist of a shaft fracture with associated joint dislocation or injury. The code for the injury complex is the radius or ulna fracture code with a qualifier of g for Galeazzi representing disruption of the distal radioulnar joint (DRUJ) and m for Monteggia representing disruption of the proximal radio-ulnar joint (PRUJ). This qualification is placed at the end of the code in round brackets (____).

  – If the coder feels that it is necessary to code for joint dislocation and its direction, the dislocation code from the universal modifiers is added within square brackets [5_] following the round brackets (Fig 2).

[Fig 2] Example of a Galeazzi and a Monteggia fracture.

  - **Galeazzi**
    
    Radial shaft, distal diaphysis, intact wedge fracture = 2R2B2(c) with dislocation of distal radio-ulnar joint 2R2B2(c,g)
  
  - **Monteggia**
    
    Ulna, proximal diaphysis, intact wedge fracture = 2U2B2(a) with anterior dislocation of proximal radio-ulnar joint [5a] = 2U2B2(a,m)[5a]
**Femur**

It is recognized that there is an ongoing controversy concerning the proper terminology for trochanteric fractures (James Krieg, personal communication, October 2016; Christopher Colton, personal communication, May 2017).² The CCF and past compendiums have established that the term **pertrochanteric means through the trochanters** as shown in group A1 and group A2. **Intertrochanteric means between trochanters** as represented in group A3. This term should be preferred to reverse oblique. To remain consistent, this revision maintains these definitions and recommends their use as noted above.

The coding system separates the pertrochanteric fractures into two groups (A1 and A2) based on the amount of fragmentation in the trochanteric region. The differentiation between groups is defined by the **lateral wall height** (d) of the greater trochanter (Fig 3). Lateral wall height or thickness is defined as the distance in millimeters (mm) from a reference point 3 cm below the inominate tubercle of the greater trochanter angled 135° upward to the fracture line on the anteroposterior x-ray. The thickness (d) must be less than 20.5 mm for the fracture to be considered an A2 fracture. It is recommended that the measurement for the lateral wall be taken using the traction view with the leg in neutral rotation.⁶ ⁷

**Fig 3** Defining lateral wall thickness.

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**Fibula**

The lower leg, like the forearm is a two-bone system. In previous editions of the compendium, the fibula had its classification linked to the tibia code. To provide more flexibility in coding, a fibula code based on the CCF principles has been added. The use of an F is required to designate the fibula. The F follows the 4 which represents the anatomical area of the lower leg or tibia/fibula. If a fibula fracture is part of ankle fracture it is coded as a 44. The fibula code is used only for fibula fractures not associated with ankle fractures.

**Proximal tibia (tibial plateau)**

A more detailed description of the morphology and location of the proximal tibia fracture lines has been suggested (Maurico Kfuri, personal communication, July 24, 2017). Kfuri and Schatzker have divided the proximal tibial articular surface into quadrants. The anterior and posterior segments are created by a virtual line from the anterior aspect of the fibular head (FH) to the posterior edge of the medial collateral ligament (MCL), which coincides with the medial tibial crest. The medial and lateral sides are determined by a line from the medial side of the anterior tibial tubercle to the posterior cortex and runs between the tibial spines. Using these two virtual planes, four quadrants of the tibial surface are defined: AL (anterolateral zone), PL (posterolateral zone), PM (posteromedial zone), AM (anteromedial zone) (Fig 4).

**Fig 4** Quadrants of the proximal tibial articular surface.

The following rules apply to this detailed addition of the proximal tibia:
1. Using the CT scan, the quadrants are defined on the axial plane of the proximal tibia surface.
2. The fracture lines are followed until they emerge on the metaphyseal cortex. This will dictate the plane of the main fracture line.
3. If the main fracture plane emerges posterior to the virtual equator it is a P. If the main fracture plane emerges anterior to the virtual equator it is an A.
4. If the majority of the fragmentation or articular surface occurs either medially or laterally it is correlated with the cortical exit and coded using the qualifications for alphanumeric codes: AM for anteromedial, AL for anterolateral, PM for posterior medial or PL for posterior lateral.
5. These are usually applied to bicondylar fractures but may also be used for unilateral plateau fractures.
Malleolar segment

An isolated medial malleolar fracture is classified as a tibial distal end segment partial articular fracture, 43B1.2 or 43B2.2.

If the medial malleolar fracture is associated with a lateral side ankle injury, it is classified as a malleolar fracture, 44.

A fracture of the posterior articular margin (Vollmann) without a lesion of the fibula is considered a fracture of the distal end segment of the tibia, 43B1.1 or 43B2.1.

If a fibula fracture is part of an ankle fracture it is coded as a 44. The fibula code is used only for fibula fractures not associated with ankle fractures.

Scapula

The four quadrants (Fig 5) are defined by the equatorial line and the intertubercular line (maximum glenoid meridian) running from the supraglenoid tubercle to the infraglenoid tubercle.

Dislocations

The coding is as follows:
• The first number represents the distal bone of the dislocated joint
• The second number is 0 for dislocation (with the exception of the shoulder girdle where all dislocations are 10.
• The third letter (A, B, C, D, or E) is utilized when there are more than two bone articulations in the anatomical region.
• The direction of the dislocation is coded using the universal modifiers for dislocation direction [5_]. By convention, the direction of the dislocation is defined as the position of the distal bone relative to its anatomical position.

17 Periprosthetic fracture—arthroplasty related

The importance of the Unified Classification of Periprosthetic Fractures (UCPF) is its descriptive nature of the prosthesis-bone interface and relationship of the fracture to the prosthesis. Consequently, the use of the classification demands that the UCPF be used as the description of the fracture in the clinical scenario.

To standardize the coding process for the compendium, a modification of the UCPF was required. In collaboration with Duncan and Haddad, an agreement was reached to have the bone fracture code described first followed by the UCPF code enclosed in square brackets, thereby utilizing it as a universal modifier.

References
