

Bony injury

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Summary box 32.2 Describing an injury /uni25CF /uni25CF - /uni25CF

Spiral Oblique Transverse

Segmental (b) Shortening T

translation Angulation Rotation

Figure 32.5 Descriptive terms for fractures (a) and type of displacement

ment (b) . Use plain language to describe: Location Soft-tissue component Bony injury

(c) (a) (d) (b) Classifi cation For each specific bony injury there may be several injury specific classification systems. AO classification The AO (Arbeitsgemeinschaft für Osteosynthesefragen) system provides a comprehensive classification of all fractures (Figure 32.10). The first number defines the bone injured and the second number the segment of bone injured: prox imal metaphysis, diaphysis, distal metaphysis. The letter and number that follows further defines the nature of the injury AO , Arbeitsgemeinschaft für Osteosynthesefragen, may be translated from the German as 'Working Party on Problems of Bone Repair'. - -

Figure 32.6 Describing fractures: the importance of rotation.

/uni00A0 (a) Anteroposterior (AP) view of the knee seen at the top of the radio- graph and lateral view of the ankle at the bottom, showing a spiral fracture at the junction of the middle and distal thirds of the tibia. /uni00A0 (b) AP radiograph of the ankle on the same patient. Note the varied diameter of the fracture fragments; this implies

rotational deformity. The distal fragment has translated laterally by 50%. There is no significant angulation on this view. Figure 32.7 Types of bony injury: (a) uninjured bone; (b) adult transverse fracture failure across the whole bone; (c) greenstick fracture; the bone has failed on the tension side; (d) torus or buckle fracture; the bone has failed on the compression side. Figure 32.8 Greenstick fractures take their name from the way in which a 'green' stick (one that is alive and has sap flowing

through it) breaks. Torus Figure 32.9 Torus fractures take their name from an architectural torus, which is the 'bulge' at the base of a column.

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2 Diaphysis 3 Distal Radius
metaphysis and ulna 2

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(a) (b) (c) (Figure 32.11). For example, the previously described humeral fracture would be 12-A1 (1 humerus, 2 diaphysis, A simple, 1 spiral). (For more detail see Further reading .)
Growth plate injury classification In child and adolescent injuries involvement of the growth plate (physis) can lead to abnormal growth or growth arrest, either complete or partial. Complete growth arrest will result in length abnormalities and partial growth arrest might result in angular deformities. The severity of injury to the physis is classified in the Salter–Harris classification, which considers whether the fracture line passes through the epiphysis, physis, metaphysis or combinations of all the above. Salter–Harris described five and Mercer Rang added the sixth (Figure 32.12)
Type I – simple fracture line just involving the physis. Seldom affects growth.
Type II – fracture line through the physis exiting through the metaphysis, producing a metaphyseal fragment. Seldom affects growth.
Type III – fracture line through the physis exiting through the epiphysis (intra-articular). Seldom affects growth, but intra-articular affecting joint surface.
Type IV – fracture line across the epiphysis, across the physis and across the metaphysis. This injury can cause focal fusion of the physis, leading to abnormal growth. Robert Bruce Salter , 1924–2010, Professor of Orthopaedic Surgery , University of Toronto, Ontario, Canada. A pioneer in the field of paediatric orthopaedic surgery , he received international awards for medical science and the Distinguished Achievement for Orthopaedic Research award. W Robert Harris , 1922–2005, formerly Professor, University of Toronto, President

of the Canadian Orthopaedic Foundation (1968) and President of the Canadian Orthopaedic Association (1975 and 1976). Charles Mercer Rang, 1933–2003, British orthopaedic paediatric surgeon. Type V – a crush injury of the physis. Growth disturbance is common and may be the first radiological sign of an injury. Type VI – injury to perichondral structures by direct trauma. Rare injury, high chance of abnormal growth.

A – Extra-articular A – After reduction complete contact between the two main fragments (>95%) B – Partial articular; B – After reduction some part of the partial contact joint remains in between the two continuity with main fragments the diaphysis (wedge fracture) C – Complete articular; C – After reduction an intra-articular no contact fracture with none between the two of the joint main fragments attached to the (segmental) diaphysis Figure 32.11 The AO classification system: the letter defines the nature of the fracture. IV V VI Figure 32.12 The Salter–Harris classification of growth plate injuries.

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