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| **Introduction** |
| * Epidemiology   + bimodal distribution     - high energy injuries in the young     - low energy falls in the elderly * Pathophysiology   + mechanism     - direct blow       * usually results in comminuted fracture     - indirect blow       * fall onto outstretched upper extremity       * usually results in transverse or oblique fracture |
| **Anatomy** |
| * Osteology   + together with coronoid process, forms the greater sigmoid (semilunar) notch   + greater sigmoid notch articulates with trochlea     - provides flexion-extension movement     - adds to stability of elbow joint * Muscles   + triceps [https://www.orthobullets.com/images/topic.png](https://www.orthobullets.com/anatomy/10020/triceps-brachii)     - inserts onto posterior, proximal ulna     - blends with periosteum     - innervated by radial nerve (C7)   + anconeus [https://www.orthobullets.com/images/topic.png](https://www.orthobullets.com/anatomy/10029/anconeus)     - inserts on lateral aspect of olecranon     - innervate by radial nerve (C7) |
| **Classification** |
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| |  |  | | --- | --- | | **Mayo Classification** | | | * Based on comminution, displacement, fracture-dislocation | [https://www.orthobullets.com/images/pencil.jpg](https://upload.orthobullets.com/topic/1022/images/mayo.jpg) | |
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| |  |  | | --- | --- | | **Colton Classification** | | | Nondisplaced - Displacement does not increase with elbow flexion | [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/non-displaced%20olecranon-colton..jpg) | | Avulsion (displaced) | [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/olecranon%20avulsion..jpg) | | Oblique and Transverse (displaced) | [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/colton-oblique%20and%20transverse..jpg) | | Comminuted (displaced) | [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/comminuted%20colton.jpg) | | Fracture dislocation | [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/olecranon%20fracture-dislocation.jpg) | |
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| |  |  |  | | --- | --- | --- | | **Schatzker Classification** | | | | Type A | Simple transverse fracture | [https://www.orthobullets.com/images/pencil.jpg](https://upload.orthobullets.com/topic/1022/images/schatzker%20classification.jpg) [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/transverse%20olecranon%20factrure.jpg) | | Type B | Transverse impacted fracture | [https://www.orthobullets.com/images/pencil.jpg](https://upload.orthobullets.com/topic/1022/images/schatzker%20classification.jpg) [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/transverse%20impacted%20olecranon%20fracture.jpg) | | Type C | Oblique fracture | [https://www.orthobullets.com/images/pencil.jpg](https://upload.orthobullets.com/topic/1022/images/schatzker%20classification.jpg) [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/oblique%20olecranon%20fracture.jpg) | | Type D | Comminuted fracture | [https://www.orthobullets.com/images/pencil.jpg](https://upload.orthobullets.com/topic/1022/images/schatzker%20classification.jpg) [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/comminuted%20olecranon.jpg) | | Type E | More distal fracture, extra-articular | [https://www.orthobullets.com/images/pencil.jpg](https://upload.orthobullets.com/topic/1022/images/schatzker%20classification.jpg) [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/oblique%20distal%20olecarnon%20fracture.jpg) | | Type F | Fracture-dislocation | [https://www.orthobullets.com/images/pencil.jpg](https://upload.orthobullets.com/topic/1022/images/schatzker%20classification.jpg) [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/fracture-dislocation%20olecranon.jpg) | |
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| |  |  |  | | --- | --- | --- | | **AO Classification** | | | | Type A | Extra-articular | [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/extra-articular%20olecranon%20fracture.jpg) | | Type B | Intra-articular | [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/intra-articular%20olecranon%20fracture.jpg) | | Type C | Intra-articular fractures of both the radial head and olecranon | [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/radial%20head%20and%20olecranon.jpg) | |
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| **Presentation** |
| * Symptoms   + pain well localized to posterior elbow * Physical exam   + palpable defect     - indicates displaced fracture or severe comminution   + inability to extend elbow     - indicates discontinuity of triceps (extensor) mechanism |
| **Imaging** |
| * Radiographs   + recommended views     - AP/lateral radiographs       * true lateral essential for determination of fracture pattern   + additional views     - radiocapitellar may be helpful for       * radial head fracture       * capitellar shear fracture * CT   + may be useful for preoperative planning in comminuted fractures |
| **Treatment** |
| * Nonoperative   + **immobilization**     - indications       * nondisplaced fractures       * displaced fracture is low demand, elderly individuals [https://www.orthobullets.com/images/question.png](https://www.orthobullets.com/trauma/1022/olecranon-fractures#3537)     - technique       * immobilization in 45-90 degrees of flexion initially       * begin motion at 1 week * Operative   + **tension band technique**     - indications       * transverse fracture with no comminution     - outcomes       * excellent results with appropriate indications   + **intramedullary fixation**     - indications       * transverse fracture with no comminution (same as tension band technique)   + **plate and screw fixation**     - indications [https://www.orthobullets.com/images/question.jpg](https://www.orthobullets.com/trauma/1022/olecranon-fractures#865) [https://www.orthobullets.com/images/question.jpg](https://www.orthobullets.com/trauma/1022/olecranon-fractures#1067) [https://www.orthobullets.com/images/question.jpg](https://www.orthobullets.com/trauma/1022/olecranon-fractures#3564) [https://www.orthobullets.com/images/question.jpg](https://www.orthobullets.com/trauma/1022/olecranon-fractures#3972)       * comminuted fractures       * Monteggia fractures       * fracture-dislocations [https://img.orthobullets.com/images/question.png](https://www.orthobullets.com/trauma/1022/olecranon-fractures#3926)       * oblique fractures that extend distal to coronoid   + **excision and triceps advancement**     - indications [https://www.orthobullets.com/images/question.jpg](https://www.orthobullets.com/trauma/1022/olecranon-fractures#3056)       * elderly patients with osteoporotic bone       * fracture must involve <50% of joint surface       * nonunions     - outcomes       * salvage procedure that leads to decreased extension strength       * may result in instability if ligamentous injury is not diagnosed before operation |
| **Surgical Techniques** |
| * **Tension band technique [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/k-wires.jpg)**[https://www.orthobullets.com/images/question.jpg](https://www.orthobullets.com/trauma/1022/olecranon-fractures#3005)   + technique     - converts distraction force of triceps into a compressive force     - engaging anterior cortex of ulna with Kirschner wires may prevent wire migration     - avoid overpenetration of wires through anterior cortex       * may injury anterior interosseous nerve (AIN) [https://www.orthobullets.com/images/question.jpg](https://www.orthobullets.com/trauma/1022/olecranon-fractures#3126)       * may lead to decreased forearm rotation [https://www.orthobullets.com/images/question.jpg](https://www.orthobullets.com/trauma/1022/olecranon-fractures#3201)     - use 18-gauge wire in figure-of-eight fashion through drill holes in ulna   + cons     - high % of second surgeries for hardware removal (40-80%) [q](https://www.orthobullets.com/trauma/1022/olecranon-fractures#1243)     - does not provide axial stability in comminuted fractures * **Intramedullary fixation [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/intramedullary%20fixation.jpg)**   + technique     - can be combined with tension banding     - intramedullary screw must engage distal intramedullary canal * **Plate and screw fixation [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/plate.jpg)**[post](https://www.orthobullets.com/video/view?id=580)   + technique     - place plate on dorsal (tension) side     - oblique fractures benefit from lag screws in addition to plate fixation     - one-third tubular plates may not provide sufficient strength in comminuted fractures     - may advance distal triceps tendon over plate to avoid hardware prominence   + pros     - more stable than tension band technique   + cons     - 20% need second surgery for plate removal * **Excision and triceps advancement [https://www.orthobullets.com/images/camera.gif](https://upload.orthobullets.com/topic/1022/images/olecranon%20excision.jpg)**   + technique     - triceps tendon reattached with nonabsorbable sutures passed through drill holes in proximal ulna |
| **Complications** |
| * Symptomatic hardware   + most frequent reported complication * Stiffness   + occurs in ~50% of patients   + usually doesn't alter functional capabilities * Heterotopic ossification   + more common with associated head injury * Posttraumatic arthritis * Nonunion   + rare * Ulnar nerve symptoms * Anterior interosseous nerve injury * Loss of extension strength |