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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
		- inserts onto posterior, proximal ulna
		- blends with periosteum
		- innervated by radial nerve (C7)
	+ anconeus https://www.orthobullets.com/images/topic.png
		- 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 |

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| **Colton Classification** |
| Nondisplaced - Displacement does not increase with elbow flexion | https://www.orthobullets.com/images/camera.gif |
| Avulsion (displaced) | https://www.orthobullets.com/images/camera.gif |
| Oblique and Transverse (displaced) | https://www.orthobullets.com/images/camera.gif |
| Comminuted (displaced) | https://www.orthobullets.com/images/camera.gif |
| Fracture dislocation  | https://www.orthobullets.com/images/camera.gif |

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| **Schatzker Classification** |
| Type A | Simple transverse fracture | https://www.orthobullets.com/images/pencil.jpg https://www.orthobullets.com/images/camera.gif |
| Type B | Transverse impacted fracture | https://www.orthobullets.com/images/pencil.jpg https://www.orthobullets.com/images/camera.gif |
| Type C | Oblique fracture | https://www.orthobullets.com/images/pencil.jpg https://www.orthobullets.com/images/camera.gif |
| Type D | Comminuted fracture | https://www.orthobullets.com/images/pencil.jpg https://www.orthobullets.com/images/camera.gif |
| Type E | More distal fracture, extra-articular | https://www.orthobullets.com/images/pencil.jpg https://www.orthobullets.com/images/camera.gif |
| Type F | Fracture-dislocation | https://www.orthobullets.com/images/pencil.jpg https://www.orthobullets.com/images/camera.gif |

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| **AO Classification** |
| Type A | Extra-articular | https://www.orthobullets.com/images/camera.gif |
| Type B | Intra-articular | https://www.orthobullets.com/images/camera.gif |
| Type C | Intra-articular fractures of both the radial head and olecranon | https://www.orthobullets.com/images/camera.gif |

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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
		- 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/images/question.jpg https://www.orthobullets.com/images/question.jpg https://www.orthobullets.com/images/question.jpg
			* comminuted fractures
			* Monteggia fractures
			* fracture-dislocations https://img.orthobullets.com/images/question.png
			* oblique fractures that extend distal to coronoid
	+ **excision and triceps advancement**
		- indications https://www.orthobullets.com/images/question.jpg
			* 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
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| **Surgical Techniques** |
| * **Tension band technique https://www.orthobullets.com/images/camera.gif**https://www.orthobullets.com/images/question.jpg
	+ 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
			* may lead to decreased forearm rotation https://www.orthobullets.com/images/question.jpg
		- 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
		- does not provide axial stability in comminuted fractures
* **Intramedullary fixation https://www.orthobullets.com/images/camera.gif**
	+ 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**post
	+ 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**
	+ 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
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