

MICOD –17/06/2024

Case contributor – Dr. Ankur Shah

MI-COD

MSS INDIA- Case Of the Day



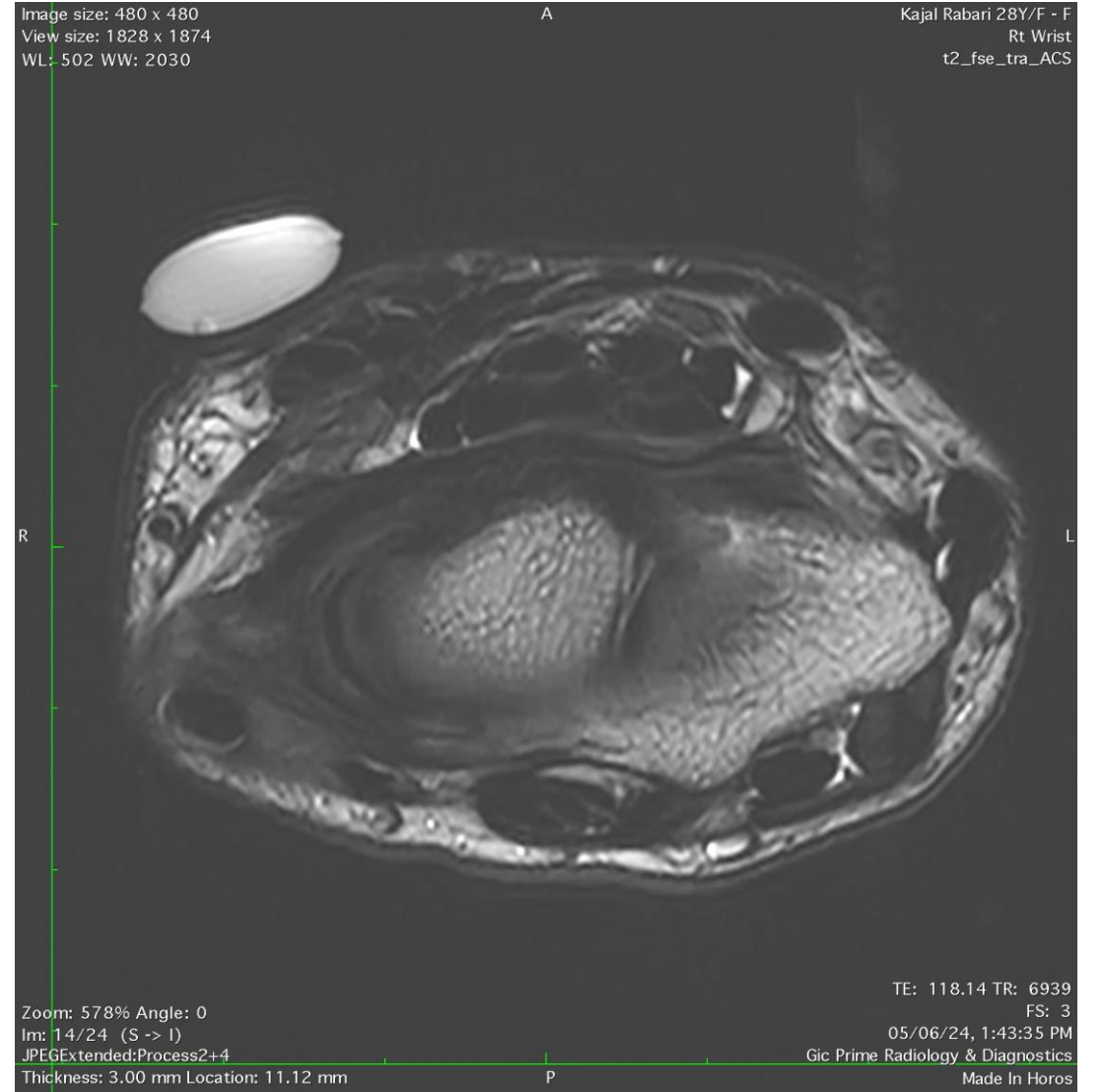
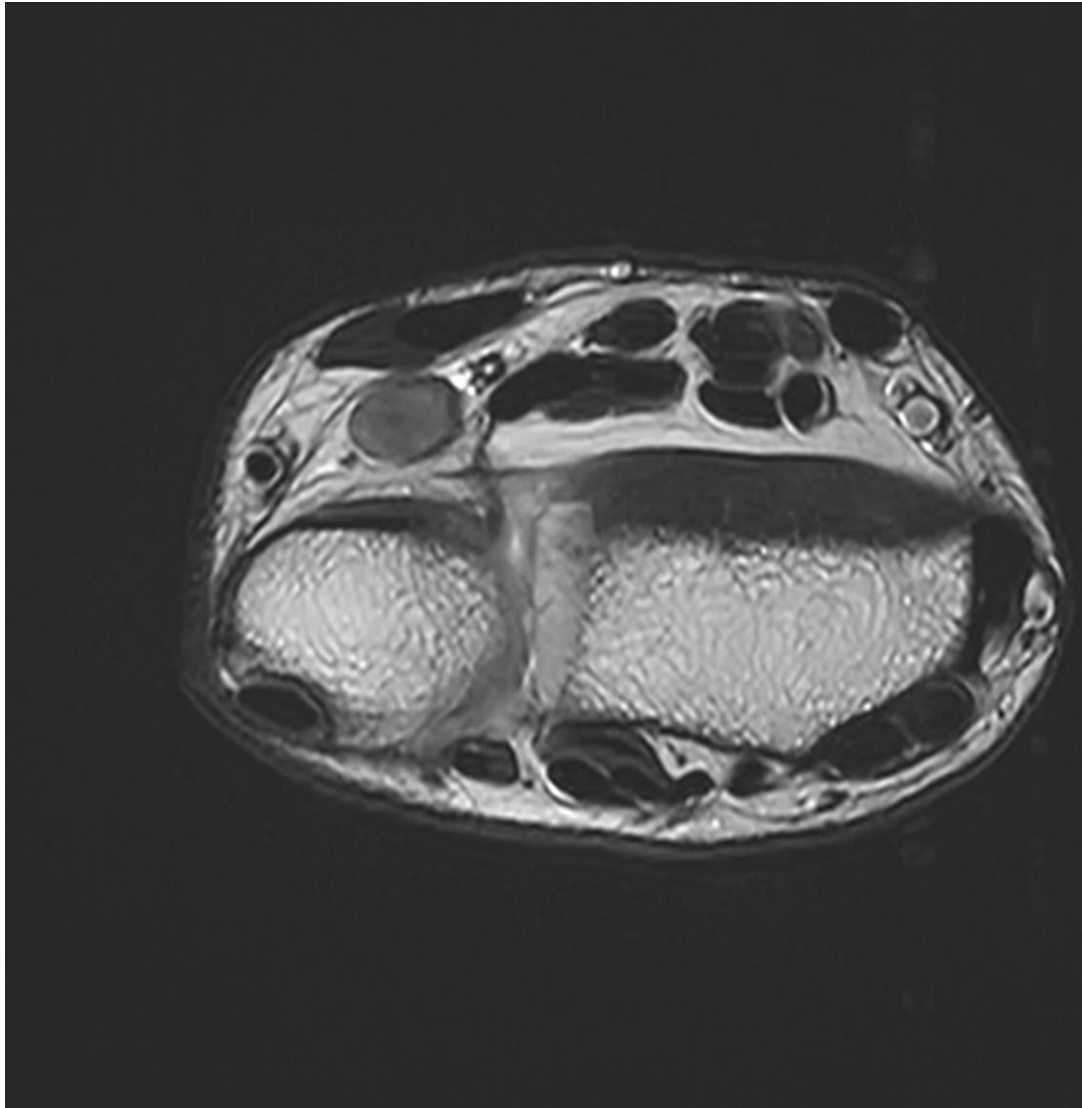
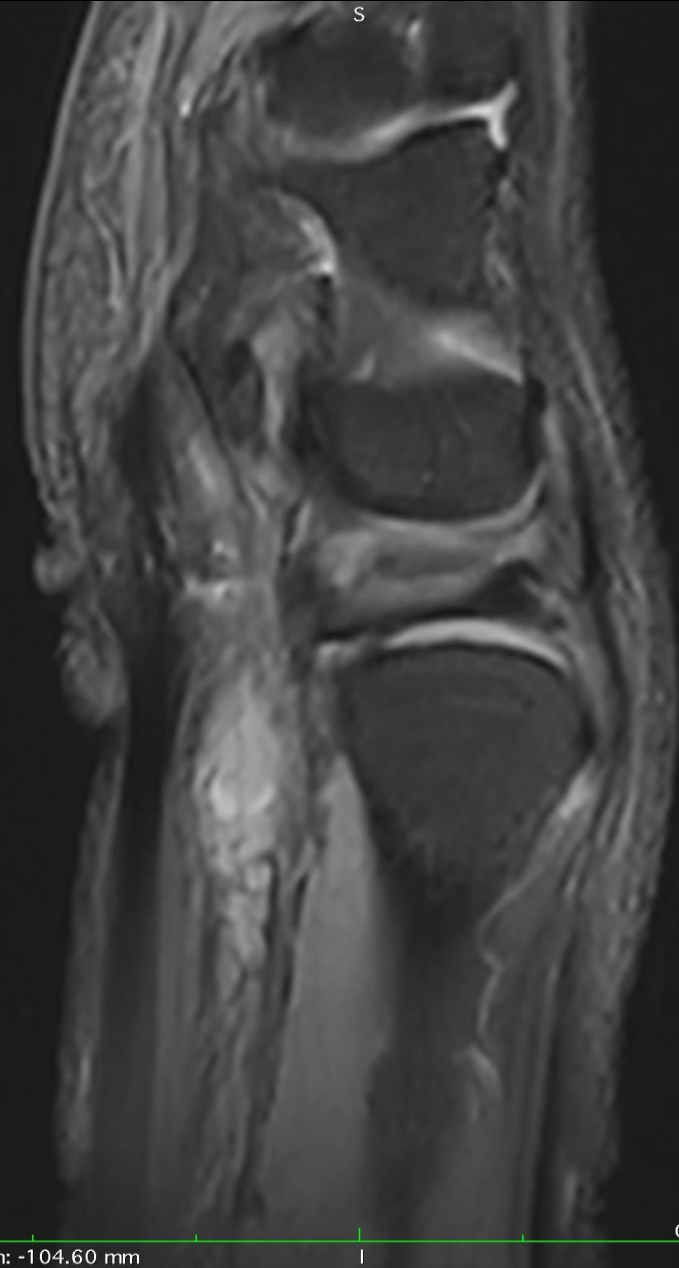
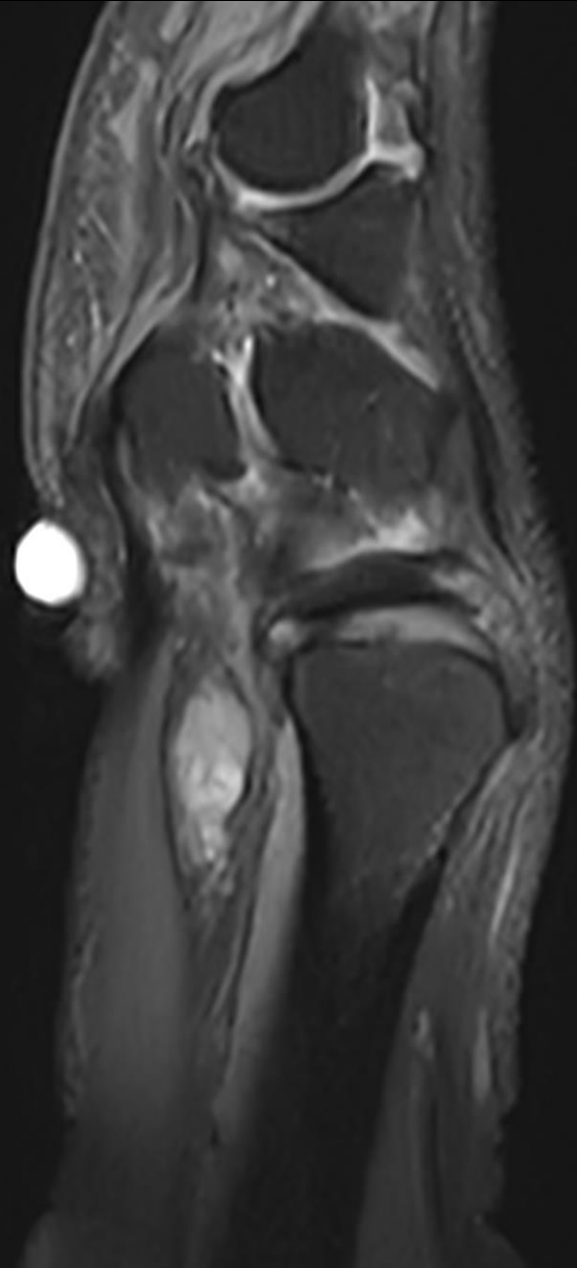


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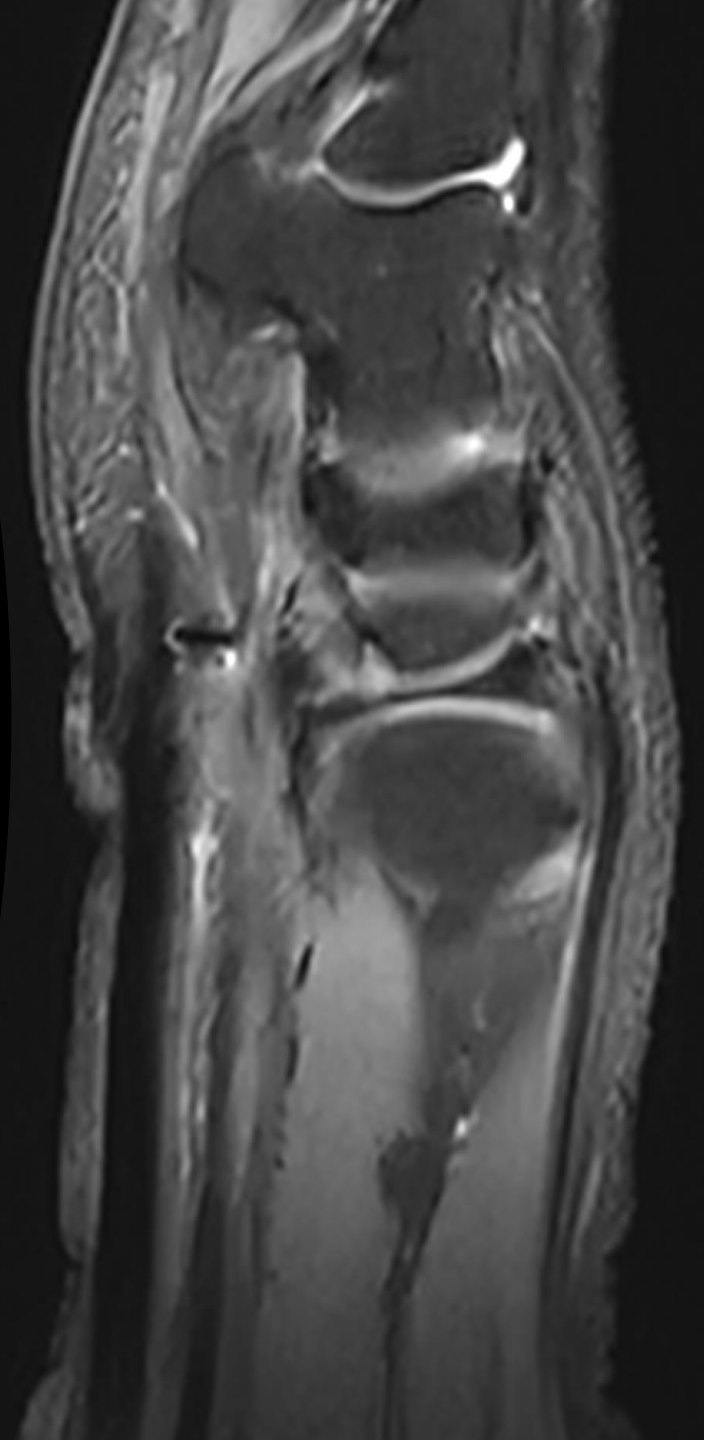
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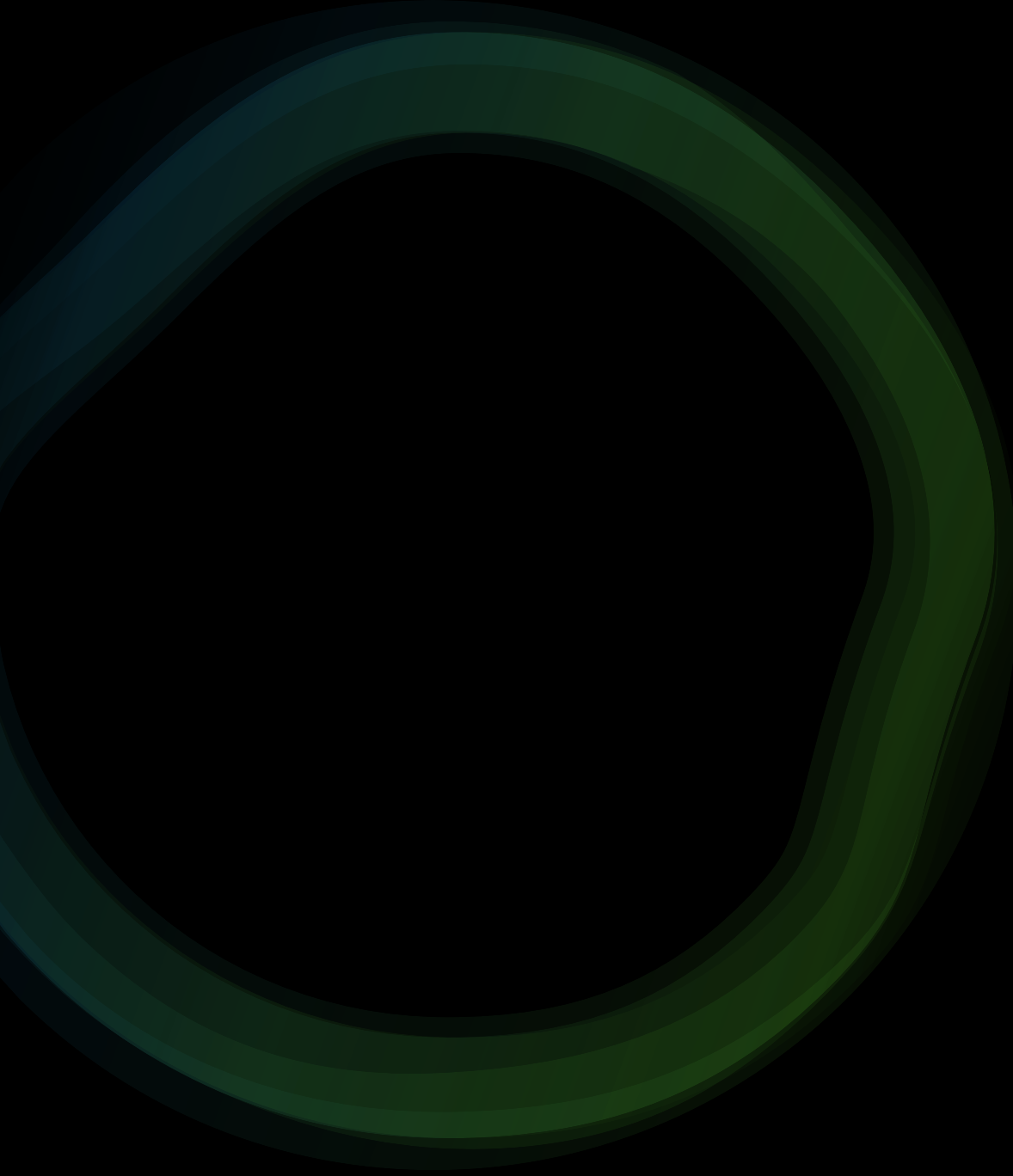
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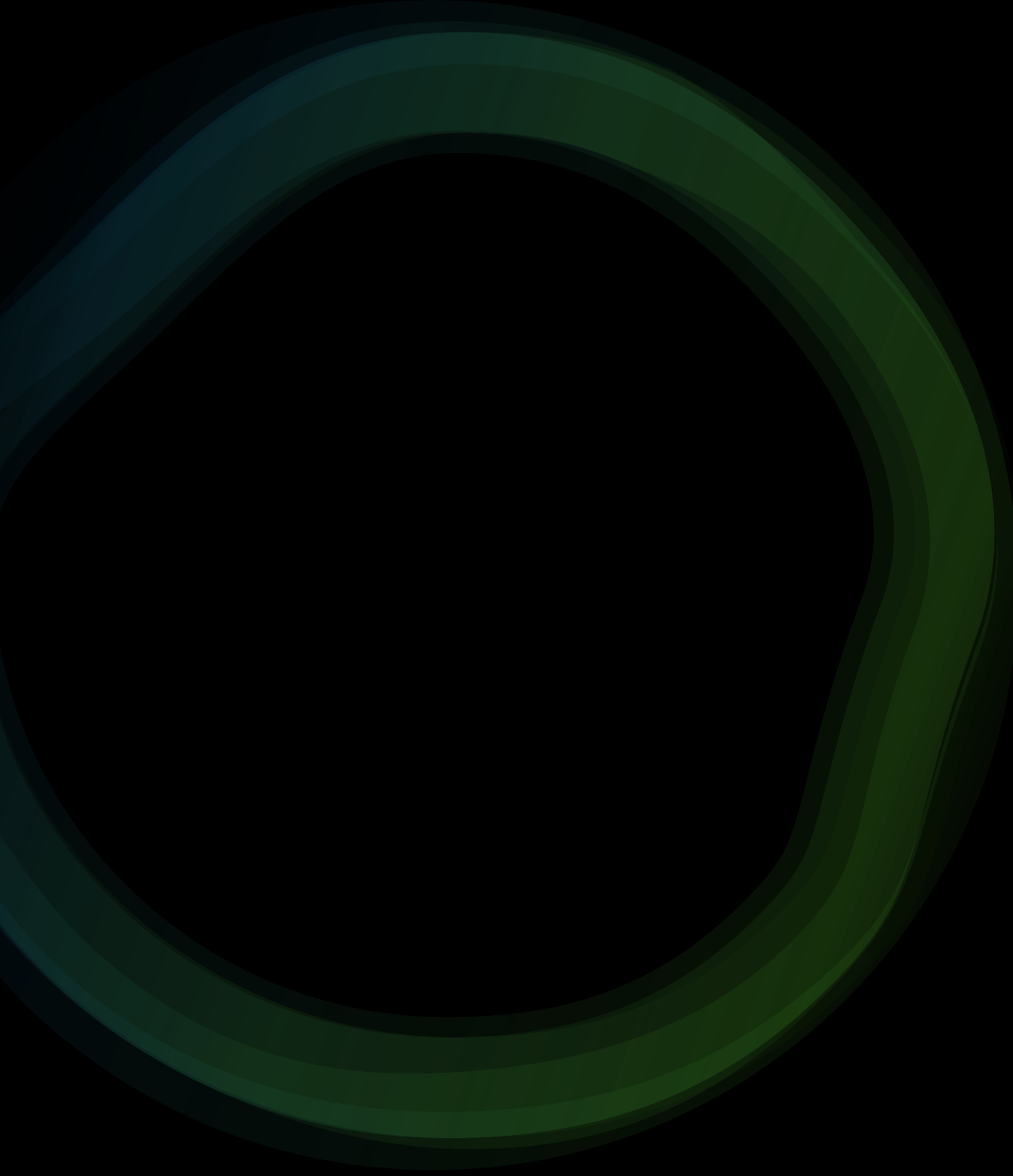
- History of injury with a sharp glass before 2 months.
C/o numbness in the ring and little fingers.

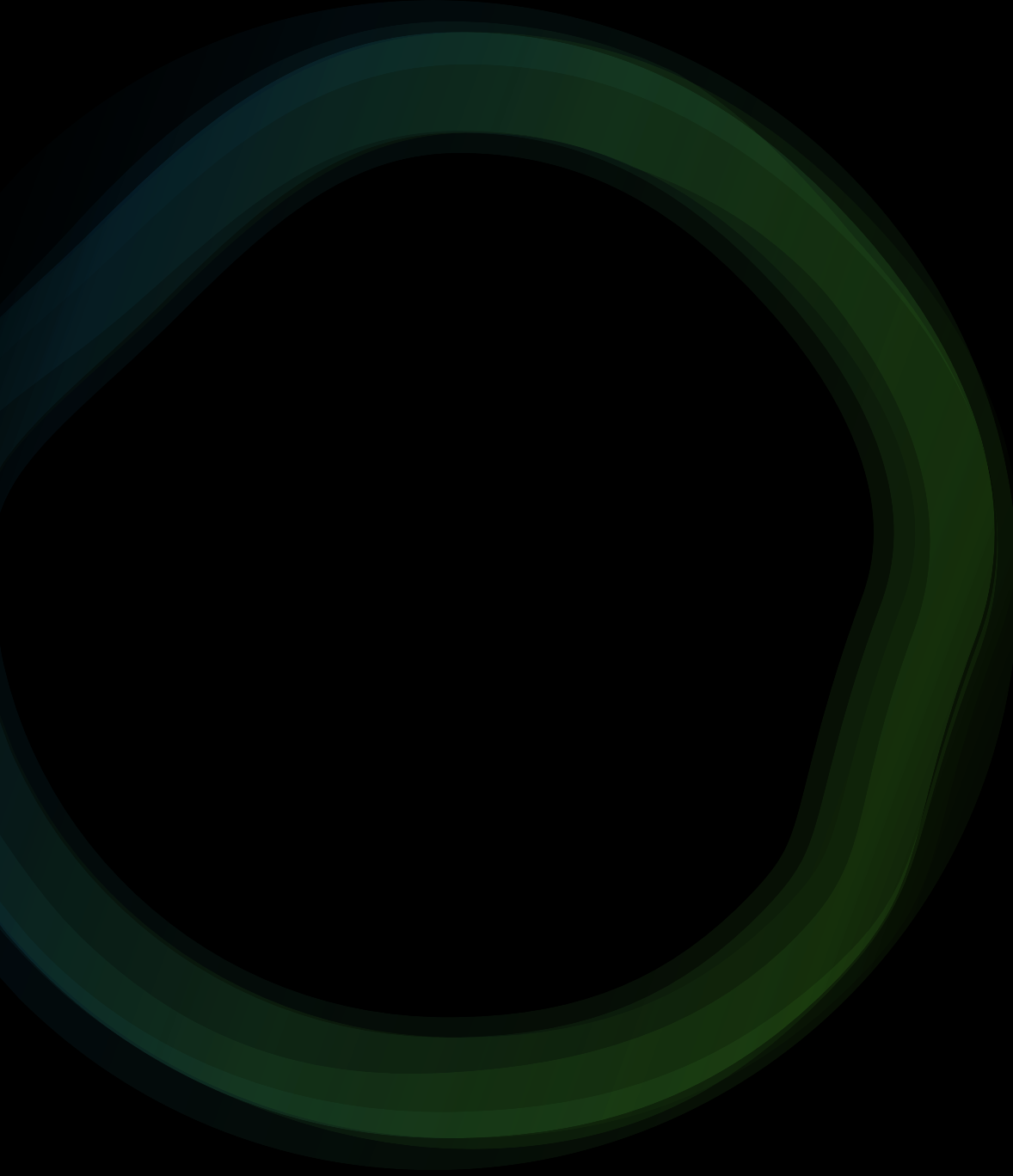



- Focal discontinuity of the ulnar nerve in distal forearm at the site of injury with a stump neuroma at the proximal end of the nerve.



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- The ulnar nerve is a branch of the C8 and T1 nerve roots and arises from the medial cord of the brachial plexus.
 - It supplies the intrinsic muscles of the hand and assists the median nerve in functioning of the flexors.
 - Traumatic peripheral nerve injuries can result from varied mechanisms. They can be due to blunt trauma, penetrating injuries, chronic traction/acute stretch injuries and less commonly due to local chemical injury, electric shock or freeze injury.

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- Acute severe injury can result from direct compression of the nerve against rigid structures like bone or by penetrating trauma.
 - Indirect compression of the nerve by hematoma, fracture fragment, aneurysm or scar usually results in subacute to chronic presentation.
 - Chronic stretch injuries may be due to overuse microtrauma (profession and sports-related), dislocations or iatrogenic injuries and are usually mild.
 - The injuries caused by explosions are associated with poor prognosis.
 - It may be noted that the nerves are usually affected in combination with the adjacent tissues; and the management of the associated bony injuries, vascular injury or soft tissue loss usually takes priority.

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- Evaluation of peripheral nerve trauma and its postsurgical outcome has classically been based on clinical and electrophysiological methods.
 - In addition to the initial clinical symptoms, the course of the neurological manifestations is also important.
 - Sometimes the patients present late, because of missed initial diagnosis or lack of referral of the patients from peripheral centers.
 - Electrophysiological studies (EPS) include measuring nerve conduction velocity (NCV) and electromyography (EMG). The function of the peripheral nerve is assessed by electrical stimulation of the nerve and recording the response at the muscle or the nerve.
 - It can be used for sensory, motor as well as mixed nerves. The response elicited gives valuable information regarding demyelination/axonal loss of the testing nerve.
 - The motor NCV is performed by giving a supramaximal stimulus to the testing nerve proximally and evaluating the response distally through an electrode placed inside the muscle supplied by testing nerve.



Goals of Imaging in evaluation of peripheral nerve injuries.

- To look for morphological evidence of nerve injury ..
- Grade the severity of injury ..
- Localize the exact site of injury ..
- Proportion & disposition of injured fascicles ..
- Identify any treatable cause (compressing hematoma, scar, bony fragments, foreign bodies like glass, screws) ..
- Provide an anatomical roadmap of nerve before surgery and pre-operative surface marking ..
- Assess injury to adjacent structures ..
- Guiding image-guided interventions ..
- For post-operative assessment & follow-up ..

SEDDON CLASSIFICATION

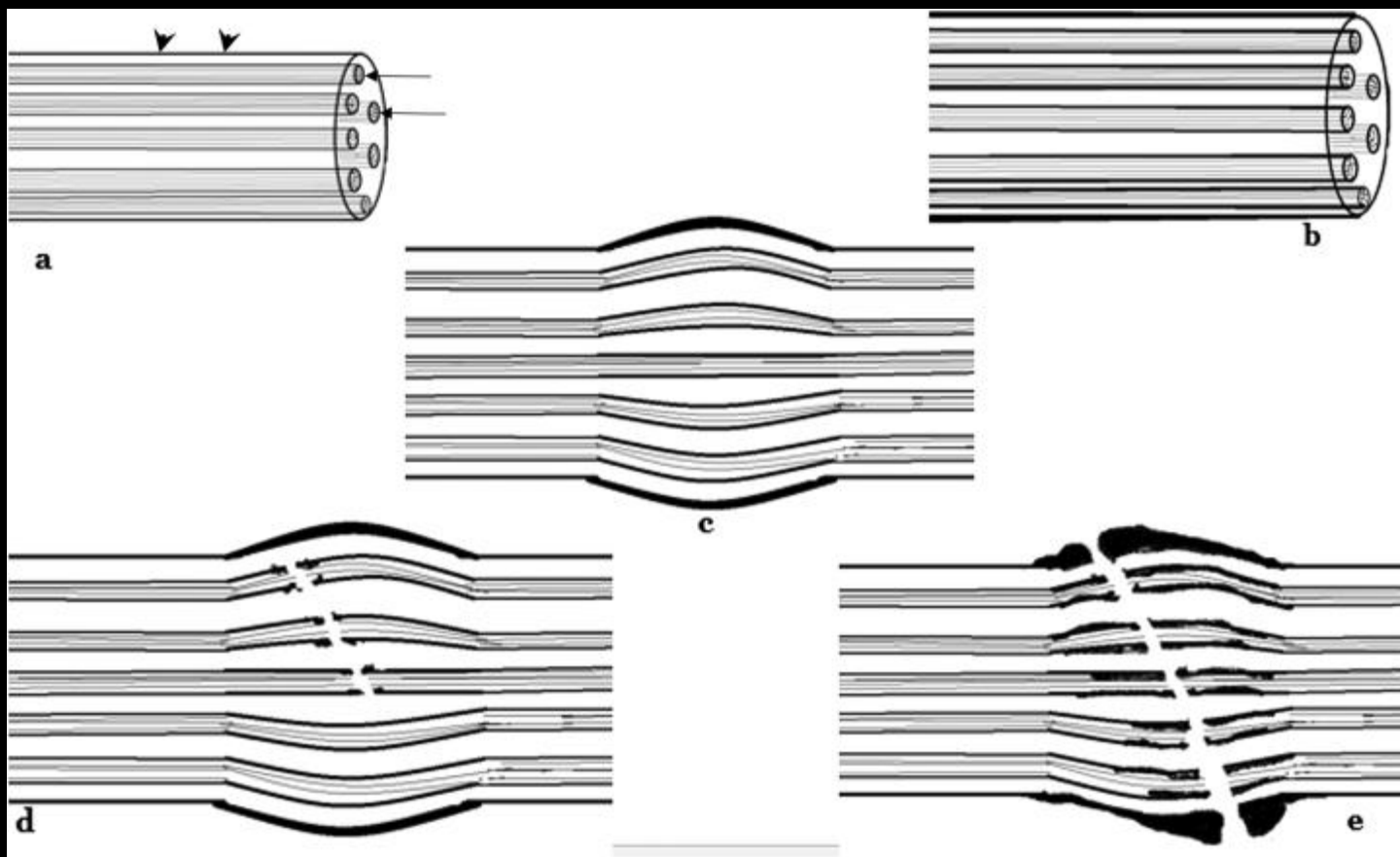
Severity	Seddon type	Clinical feature	Due to	Recovery
Mild	Neuropraxia	Temporary sensory loss	Demyelination	Complete, in 6–8 weeks
Moderate	Axonotmesis	Motor & sensory loss	Axonal loss	Complete, in few months
Severe	Neurotmesis	Motor & sensory loss	Physical discontinuity	Needs surgery

SUNDERLAND CLASSIFICATION

Seddon type	Grade	Structures injured	Key features	Management
Neuropraxia	1	Demyelination/conduction defect	Normal	Conservative
Axonotmesis	2	Axonal loss	Diffuse swelling	
	3	Endoneurium	Intact but edematous fascicles	Slow & incomplete recovery; surgery may be needed, especially to relieve external compression
	4	Perineurium	Fascicular discontinuity (Neuroma-in-continuity)	Surgery
Neurotmesis	5	Epineurium	Nerve transection with end-bulb neuromas	

Image based classification of nerve injuries with corresponding findings on ultrasound and MRI.

Severity	Sunderland Grade	Injured structures	Imaging findings	Management
Mild	1	Demyelination	Nerve is Normal or shows mild edema	Non-operative management
	2	Axonal loss (intact connective tissue)	Edema and Bulkiness* (distal to site of injury)	
Moderate	3	Endoneurium	Focally enlarged nerve (thickened fascicles) with altered echogenicity (Heteroechoic/hypoechoic) and heterogeneous signal intensity	Usually needs surgery especially with grade 4 injury
	4	Perineurium	Disruption of the fascicles/Focal loss of internal architecture with intact epineurium (Neuroma-in-continuity)	
Severe	5	Epineurium	Epineurium discontinuity (in addition to fascicular disruption) +/- Nerve gap with end neuromas	Surgery

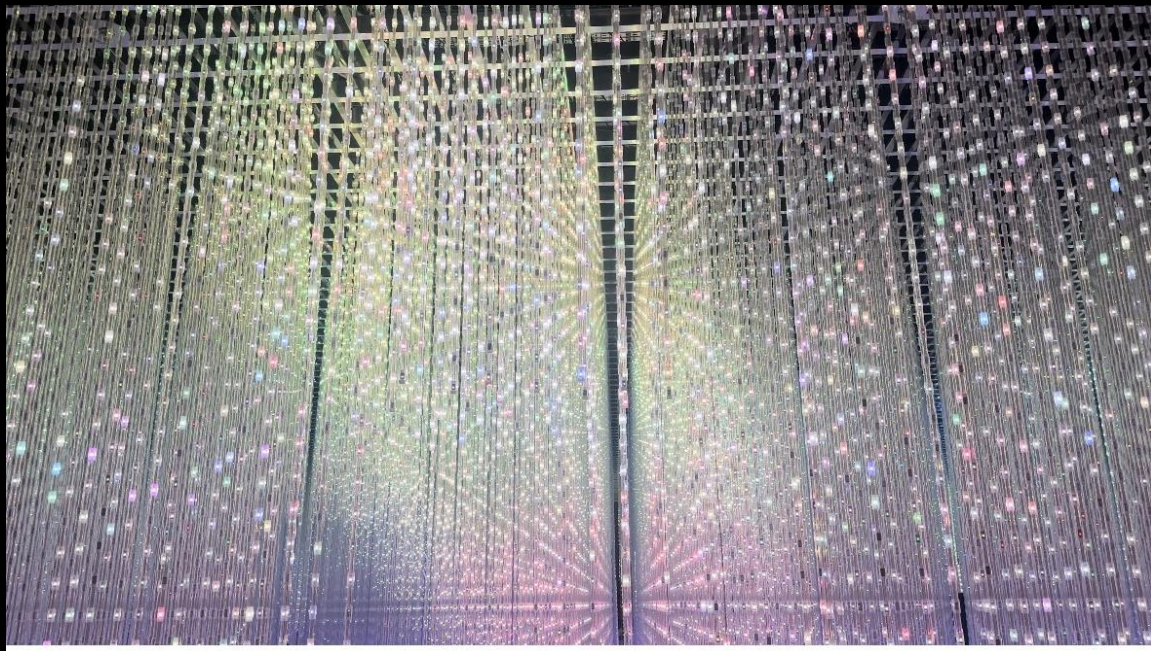


Schematic representation of different grades of nerve injuries (Sunderland). (a) Normal appearing Nerve in grade 1 injury, (b) mild bulkiness (nerve edema) in grade II injury, (c) Focal bulkiness and fascicular thickening in grade III injury, (d) Focal fascicular disruption in grade 4 injury and (e) nerve transection with discontinuity of epineurium in grade 5 injury. The individual nerve fascicles are covered by perineurium (arrows in a) while the white area between the fascicles represents the connective tissue of the inner epineurium. Outer epineurium covers the entire nerve (arrowheads in a).

Imaging of traumatic peripheral nerve injuries

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