

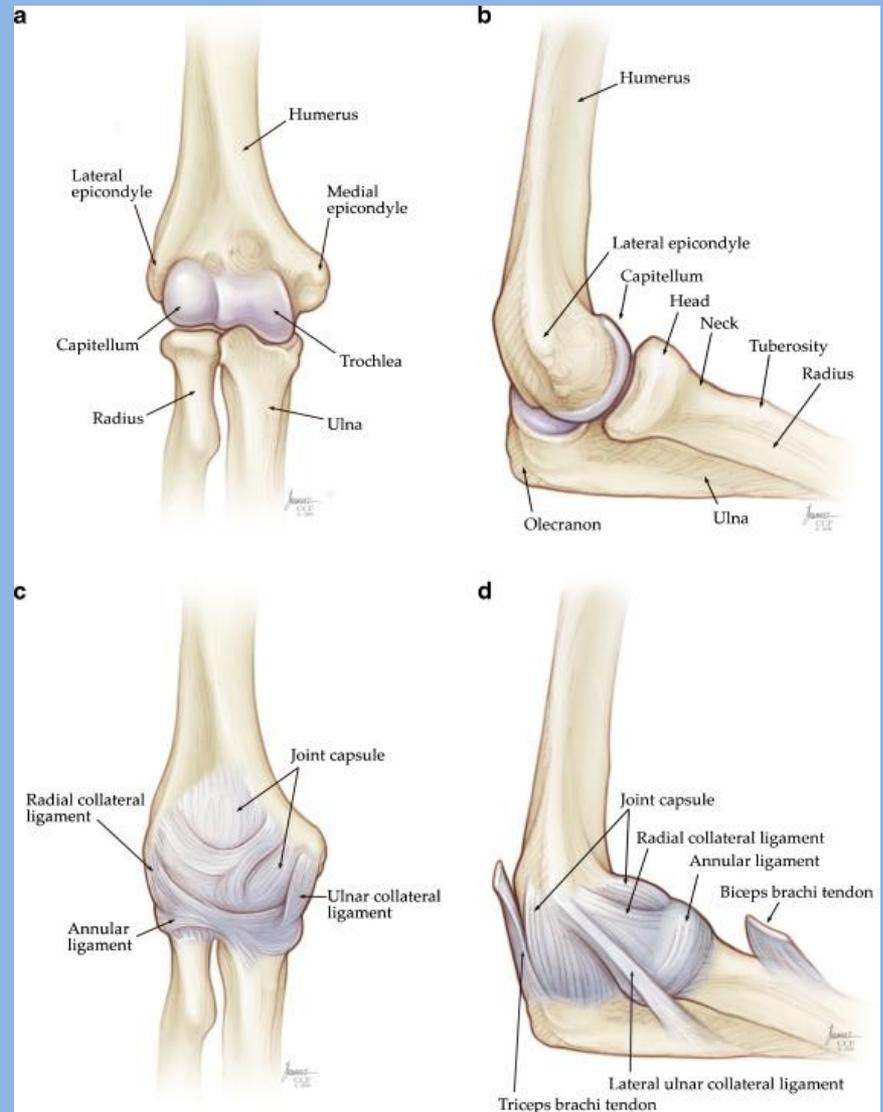


The Stiff Elbow

Snehal C. Dalal, MD
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Anatomy



Functional Range of Motion

- ▶ Bernard Morrey
- ▶ Elbow functions to place hand in space
- ▶ ROM needed for ADLS: 30-130 degrees
- ▶ Stiff elbow definition:
 - ▶ Extension loss of greater than 30 degrees
 - ▶ Flexion of less than 120 degrees
- ▶ 5% incidence of stiffness after elbow trauma

Trauma Etiologies

- ▶ Intraarticular Fracture
- ▶ Dislocation/Instability
- ▶ Osteochondral fractures
- ▶ Heterotopic Ossification
 - ▶ 3% of simple dislocations
 - ▶ 20% of fracture dislocations
 - ▶ 5-10% of closed head injury
 - ▶ 76-89% of CHI and elbow trauma
- ▶ Post-traumatic Arthritis



Heterotopic Ossification

- ▶ Formation of trabecular bone outside of skeletal structure, occupying space in soft tissue where it does not normally exist
- ▶ Does not affect the configuration of the periosteum
- ▶ Develops within muscle planes and not within the muscle fibers themselves

Prevention of HO

- ▶ Indomethacin
 - ▶ PGE-2 inhibition of bone remodeling
 - ▶ Inhibit differential of osteoprogenitor cells
 - ▶ 2004 Cochran Review: NSAID use reduced HO in LE by 59%
 - ▶ Due to nonunion and GI upset: consider COX 2 selective such as Meloxicam
 - ▶ Current ongoing study: prospective 3 wks of Indomethacin after elbow trauma
- ▶ Radiation
 - ▶ Early osteoprogenitor cells are more susceptible to inhibition than mature bone
 - ▶ No difference between preop (<4hr) and postop (<72hr) treatment
- ▶ Both have increased incidence of nonunion
- ▶ Noggin: BMP inhibitor
- ▶ Oxidation free radical scavengers
- ▶ Pulsed Electromagnetic Field (PEMF)

Prevention

- ▶ Proper alignment of intraarticular fracture
- ▶ **Gain elbow stability**
- ▶ Avoid overcompression of olecranon osteotomy site
- ▶ Early range of motion: use of CPM for 3-4 weeks
- ▶ Post-operative splint in extension: pressure diminishes bleeding and resists edema
- ▶ Literature inconclusive RE: HO prevention
 - ▶ NSAID
 - ▶ Radiation
 - ▶ Both





Evaluation

- ▶ Firm vs soft endpoint
- ▶ Classify contracture (Morrey) as intrinsic, extrinsic or mixed
- ▶ Evaluate ulnar nerve function
- ▶ AP, lateral and both oblique radiographic exam
- ▶ CT elbow with 3D reconstruction

Non-operative Treatment

- ▶ Manipulation
- ▶ Serial Casting
- ▶ Dynamic Splinting
 - ▶ Contractures less than an a year
 - ▶ Serial increase in tension
 - ▶ Night splint but be tolerated and pain free
 - ▶ Avoid co contraction
 - ▶ Use NSAID to minimize inflammation
- ▶ Static Progressive Splinting
 - ▶ Turnbuckle device
 - ▶ Stress Relaxation



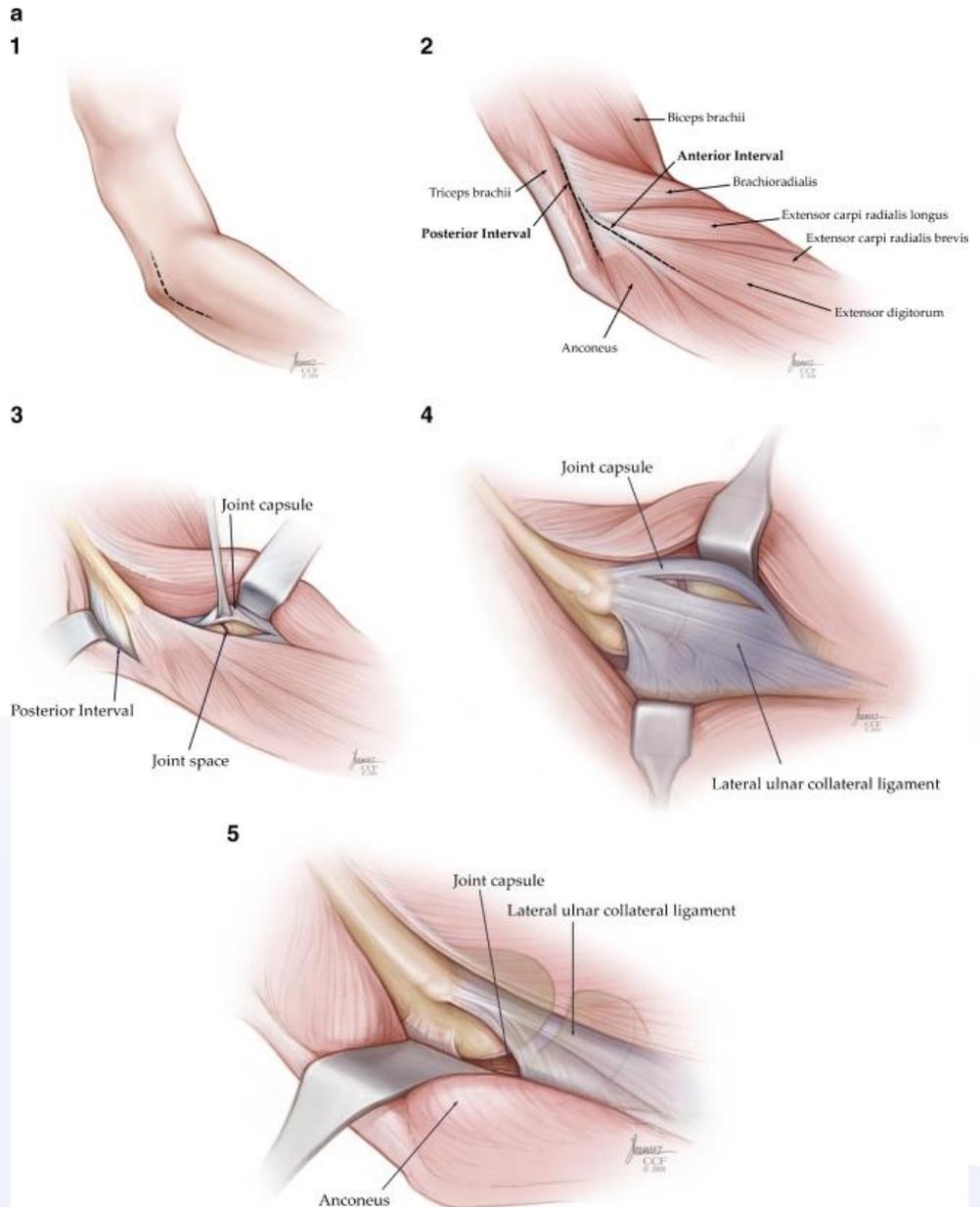
Surgical Considerations

- ▶ Consider proximity of neurovascular structures
- ▶ Respect soft tissue planes to minimize trauma
- ▶ Evaluate fracture reduction and stability
- ▶ Any extrinsic skin tightness/scarring
 - ▶ Common in degloving or burn injuries



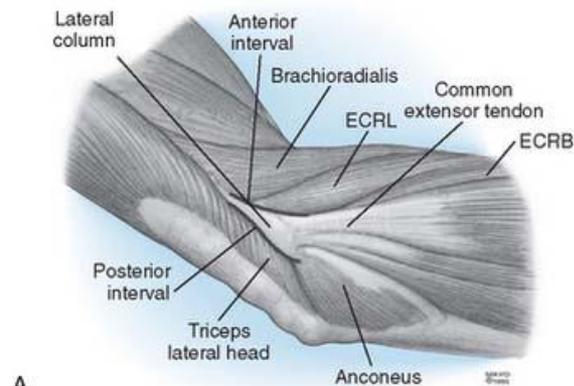
Lateral Column Procedure

- Described by Morrey
- Ulnar nerve release if flexion contracture is >100 degrees

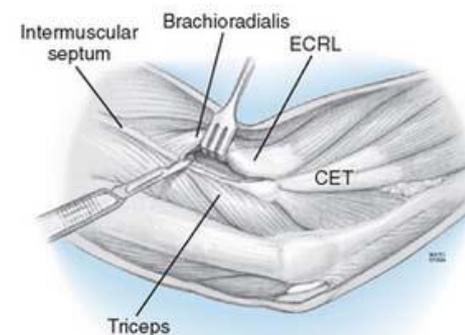


COLUMN PROCEDURE

- ▶ ID supracondylar ridge
- ▶ Work anterior and posterior
- ▶ Lift ECRL and brachioradialis off anterior capsule
- ▶ Wide excision of lateral capsule
- ▶ Lift triceps and anconeus off posterior capsule



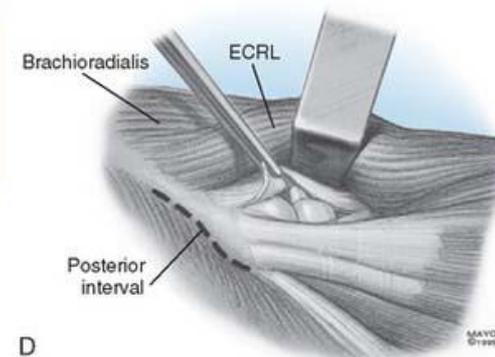
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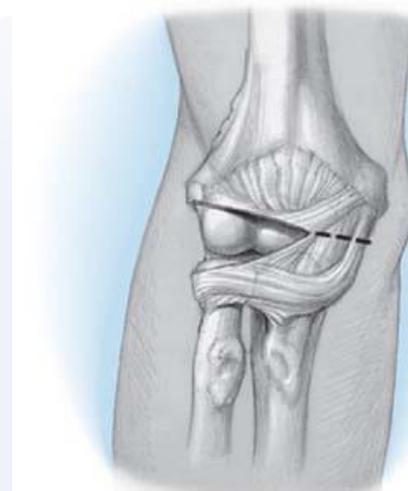
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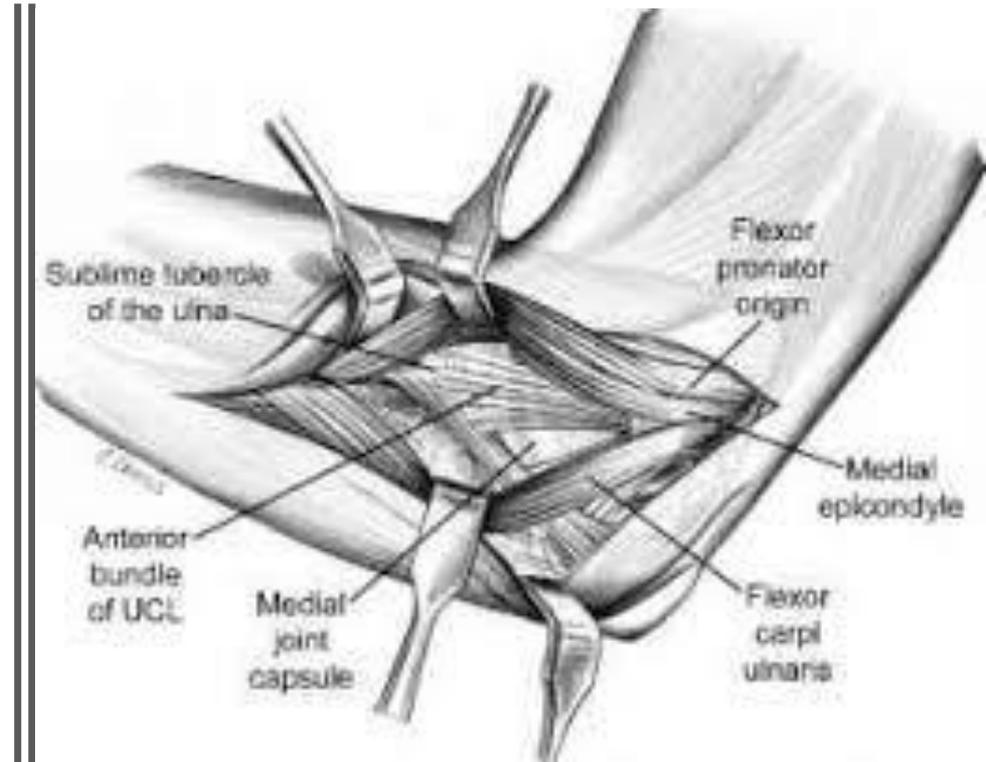
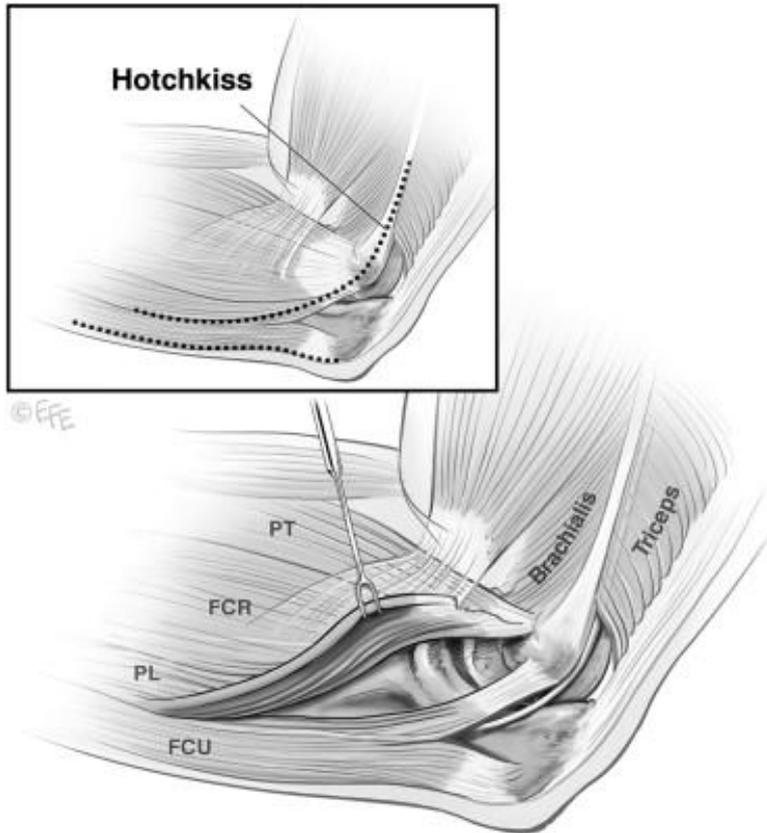
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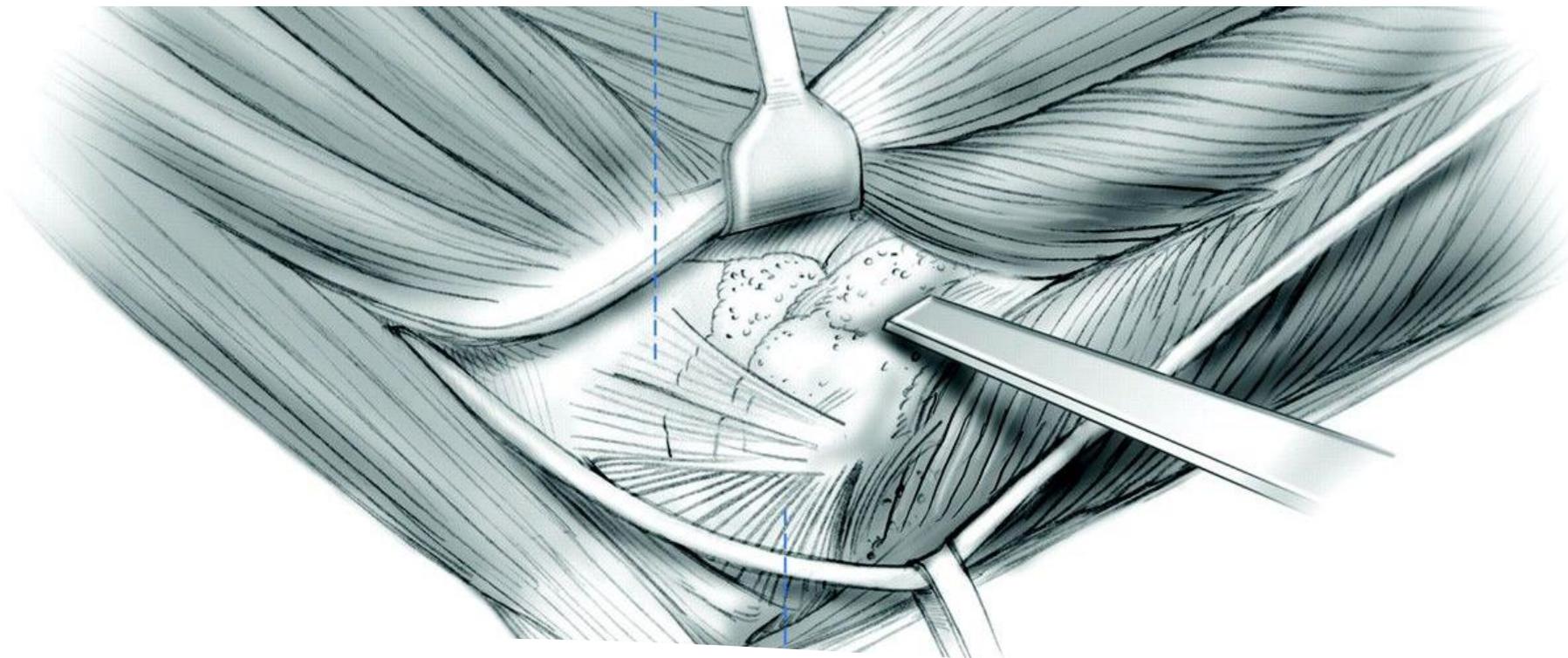
Medial Over the Top (MOTT)

Described by Hotchkiss



MOTT Procedure

- ▶ Expose ulnar nerve proximal to distal
- ▶ Find anterior edge (PT, FCR, PL) of the flexor pronator mass and separate from brachialis and median/brachial NV bundle
- ▶ Lift off medial epicondyle
- ▶ Keep FCU intact and protect ulnar nerve
- ▶ Dissect Brachialis off anterior capsule
- ▶ Splint Flexor Pronator mass for coronoid exposure
- ▶ Excise anterior capsule



Release posterior band of MCL if flexion is at or less than 90-100 degrees

Surgical Treatment - OFER

Olecranon Osteotomy-Facilitated Elbow Release (Ofer)

Ulnar nerve decompression

Chevron olecranon osteotomy

Elevate olecranon and release any adhesions

Remove posterior tether/casule

Remove posterior fibrous/bony block: deepen widen olecranon fossa, remove osteophytes

Remove anterior tether:

- detach the origin of the MCL and work medial to lateral; keep LCL complex intact; stay posterior to brachialis. Keep flexor/pronator mass origin in tact

Remove anterior fibrous/bony block:

- burr to remove coronoid osteophytes is more effective, deepen coronoid and radial fossae

Repair of osteotomy and asses motion

Arthroscopic release - described by O'Driscoll



More than 50% volume loss



Adhesions can limit visualization



Good for osteophytes and loose body removal



Minimal soft tissue trauma



Facilitates early ROM with CPM



Takes proficiency with arthroscopy and use of retractors



Anteriorcapsulectomy = risk to anterior neurovascular structures



Contraindications: previous ulnar nerve submuscular transposition, posttraumatic arthritis or OA over age 65

Arthroscopic release





Arthroscopic Release: 1 wk out



Pathology	Ulnar Symptoms	Surgical Preference
Lack Extension	NO	MOTT, UNT
		Lateral Column
		Arthroscopic Release
	YES	MOTT, UNT
		Arthroscopic Release, UNT
Lacking Flexion limited to 100 deg	NO	MOTT, pMCL release, UNT
		Arthroscopy, pMCL release, UNT
		Lateral column release (not preferred)
	YES	Arthroscopy, mMCL release, UNT
		MOTT, pMCL release, UNT
Lacking flexion >100 deg present	NO or YES	MOTT, pMCL release, UNT
		Arthroscopy, mMCL release, UNT



Thank you

(and thank God for fall football)



SEPT 3 I AT ILLINOIS THURSDAY	SEPT 12 R RUTGERS	SEPT 19 P AT PURDUE	SEPT 26 Ψ INDIANA
OCT 3 BYE	OCT 10 N NEBRASKA	OCT 17  AT MICHIGAN STATE	OCT 24 M MICHIGAN
OCT 31 M MARYLAND	NOV 7  AT PENN STATE	NOV 14 BYE	NOV 21  IOWA