The Choke Hold
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Submission Breakdown
UFC Events
- 25% of fights end in submission
- 74% of submissions are result of choke hold

Brain & Vascular Choke
- 2% of body weight
- 20% of oxygen consumption
- 25% of glucose consumption

15% of Cardiac Output

Definition
A grappling hold that critically reduces or prevents air (choking) and or blood (strangling) from passing through the neck. Neuro-vascular reflexes yield decrease in cerebral blood flow (CBF)
- May result in unconsciousness, injury to larynx or trachea, airway compromise… significant morbidity or mortality
- Vascular Choke vs Airway Choke
Blood Supply to Brain

Mechanisms and Reflexes

- Auto-regulation (AR): Intrinsic ability of the cerebral vasculature to alter its resistance in order to maintain cerebral blood flow constant over a wide range of cerebral perfusion pressures.
- Baroreceptor Reflex (BRR): Mechanoreceptors (stretch) in carotid vasculature that sense BP and relay information to the brain in order to maintain a proper blood pressure.

Cerebral Hemodynamics

- CPP = MAP - ICP (or CVP whichever is greater)
- CBF = CPP/CVR

Baroreceptor Reflex
Baroreceptor Reflex Pathway...

- Stretched “firing”
  - Sympathetic
  - Parasympathetic

- Peripheral vasodilatation
- MAP & CPP
- HR, inotropic state of heart, CO

Venous Compression

CPP = MAP - ICP

Autoregulation of CBF

CPP = MAP - ICP (or CVP whichever is greater)
CPP, CBF & Vascular Choke

(CPP = MAP - ICP)

- ↑ Cerebral Vascular Resistance (AR)
- ↑ PeripheraL Vasodilatation ↓ MAP (BRR)
- ↓ HR ↓ inotropic state ↓ CO (BRR)
- ↑ ICP (jugular venous compression)
- ↓ CPP = ↓ MAP - ↑ ICP
- ↓ CPP, CBF, O₂ delivery to brain ➔ LOC

Mechanical Artery Compression

- Mechanical compression of carotid arteries decreases radius
- Head turn limit blood flow through one vertebral artery
- LOC in 10-15 seconds, Consciousness returns 10-20 seconds
Airway Choke (compression of larynx or trachea)

- **SLN**: sensory above cords, cricothyroid muscle, tenses/adducts (more susceptible to injury)
- **RLN**: sensory below cords, innervates all intrinsic muscles of larynx except cricothyroid (less susceptible to injury)

**SLN**: injury of little consequence (voice change)

**RLN**: injury more significant may result in airway obstruction

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**Signs and Symptoms of Laryngeal Trauma**

- Pain or tenderness over laryngeal area
- Hoarseness or change in voice
- Dysphagia
- Odynophagia
- Odynophonia, Aphonia
- Hemoptysis
- Dyspnea

Low velocity, high amplitude injury potential to result in multiple fractures of laryngeal structures, generally without significant displacement, early hematoma, or laryngeal mucosal tears
Signs and Symptoms of Laryngeal Trauma

- Stridor (type may indicate level of injury)
  - Inspiratory implies supra-glottic obstruction e.g. edema or hematoma
  - Expiratory sub-glottic source such as tracheal injury
  - Biphasic inspiratory & expiratory injury at level of glottis
- Ecchymosis over laryngeal area
- Subcutaneous emphysema
- Deviation of larynx or palpable fracture
- Loss of laryngeal crepitance

Airway Choke

- Interferes with breathing may lead to asphyxia (can be life threatening)
- Less effective at yielding LOC than vascular choke
- Combatant more likely to submit
- Greater risk to combatant
- Forearm across the front of the neck free hand on wrist pulling back forearm

Airway Choke Hold

Evaluation & Treatment

- Ascertain severity of injury & identify patient that requires immediate airway intervention
- C-spine evaluation
- *Airway Management*
- Elevate Head, Ice
- Transfer to hospital (CT, CXR, C-spine)
- Steroids, Humidification, Voice Rest
- Anti-Reflux Medications, Antibiotics
Choke Summary

- Frequent Event
- Cardiac Reflexes (Decreased CO)
- Vascular Reflexes (Cerebral & Peripheral)
- Decreases in Cerebral Blood Flow
- Airway Trauma