

Airway Management Considerations for Adult Cervical Spine Injury

Aaron Murray, MD
2016

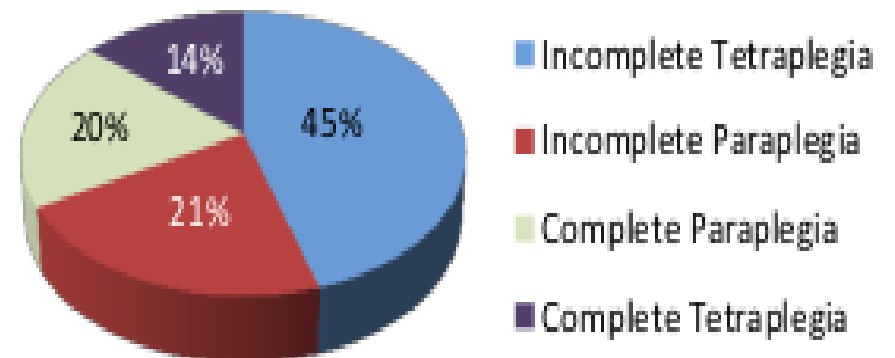
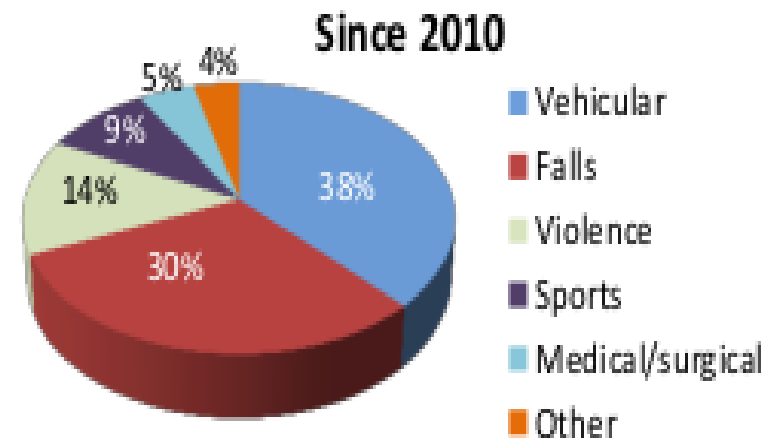


- Airway management with cervical spine injury can be a challenging scenario
- Primary goal is to prevent secondary injury
 - Limit movement, maintain normal alignment
 - Avoid hypotension
 - Avoid hypoxemia

- Injury pattern, epidemiology
- Immobilization – focus on cervical collars
- Airway maneuvers
- MILS
- Airway control – devices and techniques

Injury Pattern & Etiology

- Approx 12,500 new SCI cases/yr in US
- Bony vs. Ligamentous
- Traumatic instability
 - Often C1/2, C6/7
 - Usually male, <30 y.o.



Injury Pattern & Etiology

- Non-traumatic instability
 - Commonly arthritic in nature
 - RA: especially atlantoaxial instability
 - Congenital laxities of soft tissue, ligamentous structure
 - e.g Down's syndrome
 - Malignancy
 - Infection

Unstable C-Spine: Not just relevant to a “Trauma” hospital!

Cervical Collars

Cervical Collars

- Goal is to prevent secondary injury due to motion
 - Reduce mouth opening
 - Limit neck extension
 - Combination increases difficulty of airway management
 - Prior to using immobilization, secondary neurologic injuries were reported, and a reduction in such injuries was seen with neck immobilization (Crosby, CJA, 1992)
 - But no RCT's and cervical collars are not perfect...

CERVICAL COLLARS ARE INSUFFICIENT FOR IMMOBILIZING AN UNSTABLE CERVICAL SPINE INJURY

MaryBeth Horodyski, EDD,* Christian P. DiPaola, MD,† Bryan P. Conrad, PhD,* and Glenn R. Rechtine, II, MD†

- Cadaver study
- Intact vs Unstable C5/6
- Ambu 1-piece vs. Aspen 2-piece vs no collar
- Flexion, extension, rotation
- Concluded that unstable c-spines had more motion, and that while c-collars are better than no immobilization, they do not effectively reduce motion
- Exercise caution esp with pt transfer

How do airway maneuvers effect cervical spine motion?

Airway Maneuvers

- Jaw thrust
 - More c-spine movement than orotracheal intubation
 - Aprahamian et al 1984, Donaldson et al 1997
- Mask Ventilation
 - More c-spine movement than orotracheal intubation (Hauswald et al 1991; cadaver study), Less motion (Turkstra 2005; healthy volunteers)
- Cricoid pressure
 - Despite an older cadaveric study indicating cervical movement with cricoid pressure (Donaldson 1993) two more recent studies indicate no significant displacement of c-spine (Helliwell 2001, Aoi 2011)
- Difficult to compare studies due to different study type (healthy vs cadaver) and for operator performing technique

**Manual
In-
Line
Stabilization**

MILS

- Performed to immobilize c-spine
 - MILS also can decrease mouth opening, contributes to poor laryngoscopic view, increases time to intubation
 - Compared to c-collar, MILS did have a better laryngoscopic view and less c-spine motion during oral intubation (Gerling et al, 2000)
- MILS used before applying c-collar
- MILS used in suspected or unstable c-spine injury for intubation
 - Front of collar removed to help optimize intubation effort
 - Collar replaced after intubation

MILS

- No RCT of using MILS
 - No data that MILS reduces risk of neurologic injury
 - But...(rare) reports of neurologic injury when MILS not used during intubation
- Data for MILS reducing cervical motion with intubation are contradictory
 - Most show a reduction in cervical motion with airway management, but other studies have shown no difference or even increased subluxation at specific vertebral levels.

What are the advantages and disadvantages of various intubation techniques in the setting of unstable cervical spine and MILS?

Airway Control & Intubation

- Direct laryngoscopy
 - Rapid and familiar procedure, Miller blade may have less cervical movement compared to Mac
 - Increased difficulty with MILS, c-spine motion still occurs even with MILS
- Videolaryngoscopy
 - Better glottic view compared to DL. Assistants can anticipate how to help.
 - Cervical motion data difficult to interpret. Overall trend toward less motion.
 - Recent metaanalysis by Suppan et al (BJA, 2016) showed VL reduced first attempt failure rate compared to Macintosh blade
 - Operator experience, may still be difficult to pass ETT
- Complementary?

Airway Control & Intubation

- Supraglottic airways
 - Good rescue airway
 - Displaces cervical vertebrae posteriorly, blindly passing ETT through SGA can cause injury or fail, NPO status
 - Prasarn et al (2012) had a 23% failure rate to pass ETT blindly
- Fiberoptic Intubation
 - Preferred technique in awake, cooperative, HD stable patient – minimal c-spine movement, can allow for post-intubation neuro exam
 - Setup can take some time, blood/secretions can impair view, duration

Airway Control & Intubation

- Bougie
 - Increased success rate with MILS, decreased force of laryngoscopy, and decreased intubation time (Gataure 1996, Hung 2013, Nolan 1993)
- Lighted stylets
 - Very little cervical movement, but “blind” procedure (Turkstra et al, 2005; Prasarn et al 2012; Wendling et al 2013)
 - Not really practical to dim/turn off lights to optimize transillumination during acute trauma scenario

Challenges

- No evidence for superiority of any one intubation technique for all patients
- RCT's on unstable c-spines difficult to justify
- Most data from studies on cadavers or healthy volunteers.
- Difficult to control for operator techniques for airway maneuvers, MILS, intubation
- Contradictory data and unanswered questions

Key Points

- Secondary neurologic injury is rare, but can be devastating
- Minimize movement, avoid hypotension, avoid hypoxemia
- Evaluate the patient, consider situational context prior to intubation
- Utilize MILS
- Gain experience with 2 devices and a rescue airway
- Consider using a bougie
- Go with a technique that is likely to be successful on your first attempt