

BOC03

Delayed Detection of Esophageal Intubation in Anesthesia Malpractice Claims

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Disclosures: **M.R. Honardar:** None. **K.L. Posner:** None. **K.B. Domino:** None.

Background: Esophageal intubation was a major source of anesthesia patient death and brain damage and major source of liability in the 1980s [1]. In 1991, identification of CO₂ in the expired gas to verify correct position of the endotracheal tube became an ASA standard of basic anesthetic monitoring [2]. This study aims to identify factors associated with delayed detection of esophageal intubation in anesthesia malpractice claims after this change in monitoring standards.

Methods: After IRB approval, we analyzed 45 claims for delayed detection of esophageal intubation that occurred in 1995 or later in the Anesthesia Closed Claims Project Database of 10,816 claims. Personnel performing the intubation, location, and factors associated with delayed detection were abstracted from claim narratives. Payment data was adjusted to 2015 values using the Consumer Price Index, with median and interquartile range (IQR) reported. Esophageal intubations between groups were compared by Fisher's exact test and Mann Whitney U Test with $p < 0.05$ for statistical significance.

Results: Greater than 2/3 (69%) of delayed detection of esophageal intubation in this study occurred in the year 2000 or later. Half (49%) occurred during anesthesia care in the OR or a NORA location. Purely elective cases accounted for 29% and resuscitation for 38%. Two-thirds (64%) of esophageal intubations were performed by an anesthesiologist and half (47%) were detected by an anesthesiologist (same or different). In 76% of claims, esophageal intubation was recognized during resuscitation and in 13% not until autopsy.

In 60% of cases, a quantitative or qualitative CO₂ detection device was available at the time of intubation. The most common reasons for delayed detection were associated with CO₂ monitoring (73%) such as not using or ignored end-tidal CO₂ or equivocal change in calorimetric CO₂ (Table). In 33% of cases, late detection was associated with confusion over differential diagnosis, most often bronchospasm (Table). Cardiac arrest without cardiac output contributed to delayed detection in 13%. Communication problems occurred in 27% of esophageal intubation claims and were more common when the anesthesiologist was called to help in a non-anesthesia location (43%) than during anesthesia care in the OR/NORA (9%, $p = 0.017$).

Nearly all esophageal intubations with delayed detection resulted in patient death or severe brain damage (96%). Most (67%) resulted in payment made on behalf of the anesthesiologist with median payment of \$665,000 (IQR \$236,000 - \$1,213,500). Payment on behalf of the anesthesiologist was more common when the anesthesiologist had performed the intubation (86% paid) than when performed by others (50% paid, $p = 0.041$), but the payment amount did not differ between groups.

Discussion: Although end-tidal CO₂ monitoring was available in many cases and has been a standard of care for confirmation of endotracheal tube placement since 1991, CO₂ detection issues as well as differential diagnosis errors contributed to persistence of delayed detection of esophageal intubation in malpractice claims. Training and education to prevent confirmation bias and fixation errors have potential to reduce catastrophic patient injury from delayed detection of esophageal intubation.

References:

1. Caplan et al. Anesthesiology 72:828-33, 1990.
2. American Society of Anesthesiologists. Standards for Basic Intra-Operative Monitoring. Amended 10/23/1990, effective 1/1/1991.

Figure 1

Table: Reasons for Delayed Detection of Esophageal Intubation

	N (% of 45)
CO₂ Detection Issues	33 (73%)
-Did not use CO ₂ device	11
-Ignored ETCO ₂ reading	9
-Equivocal color change	6
-Saw positive CO ₂ /misinterpreted CO ₂ detection	5
-Thought device broken	3
Differential Diagnosis	15 (33%)
-Bronchospasm	11
-Other*	4
Cardiac arrest without cardiac output	6 (13%)

*Other differential diagnoses were pneumothorax, hypovolemia, severe bilateral pneumonia, and restrictive pericarditis with pleural effusion.

Note: Totals sum to >100% and >45 due to multiple reasons in many claims.